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ABSTRACT

A study examined the current and projected labor market for graduates of master's degree, doctoral degree, and other professional continuing education programs in Great Britain. The latest available data regarding employment patterns, supply, and recruitment postgraduates in scientific/engineering fields were reviewed, and future trends were identified. Both the perceived purpose of postgraduate study and the output and employment of postgraduates were found to have increased considerably over the past decade. Although the traditional role of postgraduate study as a first step to industrial research or academic teaching careers has decreased, its role in training and development has increased and will likely continue to do so. Because postgraduate study is increasingly serving as a means of alleviating specific skill shortages and as an extension to first degree study, the balance in output of postgraduates has shifted away from Ph.D. study and toward master of sciences and postgraduate diplomas in more vocationally oriented disciplines. Little evidence exists of the clear benefits of postgraduate study to individuals in terms of career progress or financial rewards. The supply of postgraduates will likely increase along current lines, and labor market demand for postgraduates who are "superspecialists" in scientific/engineering fields is unlikely to increase significantly. (Contains 48 references.) (MN)

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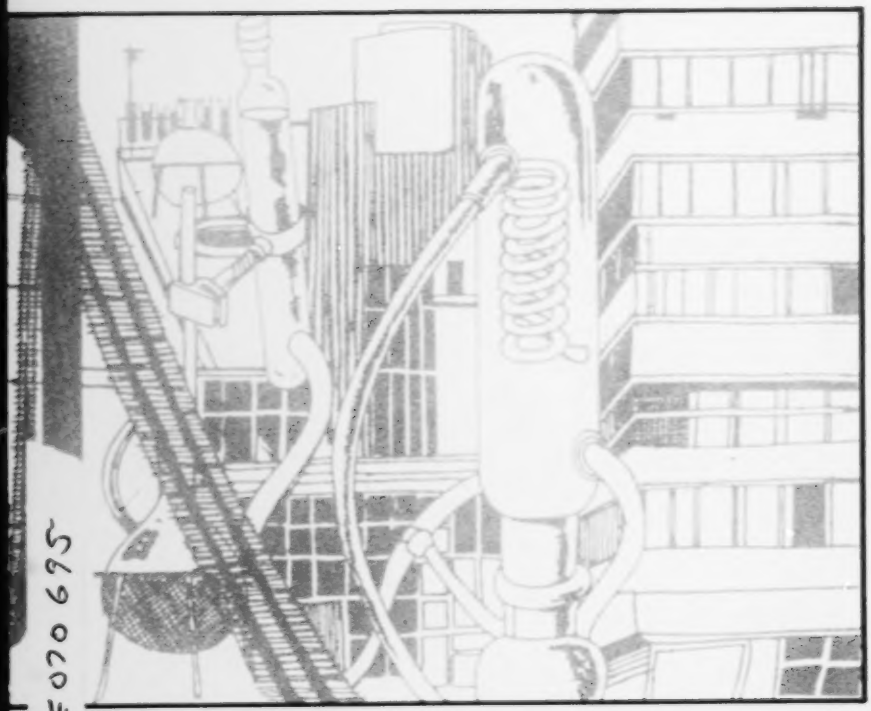

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Helen Connor
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The Institute of Manpower Studies is an independent, international centre of research and consultancy in human resource issues. It has close working contacts with employers in the manufacturing, service and public sectors, government departments, agencies, professional and employee bodies, and foundations. Since it was established over 20 years ago the Institute has been a focus of knowledge and practical experience in employment and training policy, the operation of labour markets and human resource planning and development. IMS is a not-for-profit organisation which has a multidisciplinary staff of over 50. IMS expertise is available to all organisations through research, consultancy, training and publications.

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Executive Summary

This paper is about a wide-ranging review of the nature and workings of the postgraduate labour market undertaken by IMS for the Employment Department between November 1992 and February 1993. It is based mainly on research evidence from the literature and available statistical material, supplemented by a small number of interviews with employers.

The output and employment of postgraduates has grown considerably over the last decade, as has the perceived purpose of postgraduate study. Its traditional role as a first step to an industrial research or academic teaching career has reduced. Increasingly, it is being used as part of professional training and development (*eg* for teachers, librarians, lawyers, town planners, *etc.*), as a means of alleviating specific skill shortages (*eg* IT in the late 1990s), and as an extension to first degree study. As a consequence, the balance in output has shifted away from PhD study and towards MSc degrees and Postgraduate Diplomas (PgDs), and towards more vocationally orientated disciplines. There has been a growth in part-time study, and in work-related training initiatives. The role of public funding has been declining.

Currently, 2.3 per cent of the workforce holds a higher degree[1] representing just over half a million people, and about one in four of the total degree qualified population. In 1981, the total number of postgraduates was considerably less, at approximately 170,000, or about one in ten of the population. In total, the annual output of postgraduates (PhD, MSc and PgD) increased by 40 per cent during the 1980s, with much of this growth starting in 1984.

PhD graduates represent about one in four of the total postgraduate output at universities, but less in the former polytechnic sector. Approximately 40 per cent are overseas students. Almost half of the total PhD output is in science, and considerably less, about one in six, in engineering and technology. Overall, the number of PhDs awarded in the (former) university sector grew by one third between 1980 and 1991.

At masters degree level, the pattern is somewhat different. Between 1981 and 1989 university output grew by over 60 per cent and CNAA awards doubled. The latter, however, still only represented 15 per

[1] This includes graduates from PGCE and other diploma courses where a first degree is an essential entry requirement, as well as masters degrees and PhDs.

cent of the total awarded in 1989. The largest discipline groups are science and engineering (representing 21 per cent of the total from universities), social sciences (18 per cent) and business/management (18 per cent). Major growth subjects in the last ten years have included: IT, business/management, medical-related professions and social sciences. Engineering, and to a lesser degree science, have shown lower than average growth rates, dropping from a combined 28 to 21 per cent of the total output between 1980 and 1991. This contrasts with a rise from 13 to 18 per cent for business/management studies. Women's representation is lower overall at masters than at first degree level.

Postgraduate Diplomas (PgDs) cover a range of professional and vocationally orientated courses (*eg* teaching, social work). Approximately 20,000 have been awarded per year, almost half by CNAA accredited bodies. Within the CNAA total, one in three were PGCEs.

Various factors have contributed to this growth in overall postgraduate supply, including: an increased supply of qualified entrants (*ie* new young first degree graduates and mature students); funding availability, especially government initiatives to alleviate skill shortages, and increased employer sponsorship; a growth of part-time courses; changes to entry qualifications for some professions; increased interest in MBAs among individuals and employers; and a more important role for postgraduate training at professional and managerial levels within employing organisations.

Unemployment rates for postgraduates have been low historically, and currently stand at around four per cent, though this figure varies between disciplines. It is much lower than for first degree graduates. One explanation is the greater vocational orientation of much of postgraduate study, and its relevance to employment. Another is that the employment destination figures do not distinguish between part-time and full-time study, nor those who are being sponsored by an employer. Low unemployment rates do not necessarily equate to high demand *per se*: many postgraduates enter jobs where their qualification is neither relevant nor desirable. Furthermore, many are already in employment while studying part-time, or return to previous jobs after completing their studies.

There is considerable subject specificity in relation to the employment sector and type of work that postgraduates enter due to the highly vocational nature of many masters degrees and PgDs. But there are also some disciplines (such as IT, statistics, management) which have a very wide employment spread. At PhD level, the academic sector remains the predominant destination but an increasing proportion are entering contract research work rather than permanent academic teaching/research positions. On the whole, there is considerable overlap between the PhD and masters labour markets, and the first degree and postgraduate labour markets, and a considerable number of postgraduates enter jobs which are similar to those of first degree graduates.

Outside of the HE sector and research-based organisations, there is little specific demand for postgraduates, especially PhDs. In industry

and commerce, the majority of postgraduates are recruited as part of companies' mainstream graduate recruitment programmes, where personal characteristics and evidence of relevant work experience are important selection criteria. The exception is when professional entry qualifications, obtained through postgraduate study, are called for (*eg* law). A growing area of demand is from employers who wish to sponsor their own employees on a programme of postgraduate study, as part of a professional/careerdevelopment plan, rather than recruit newly qualified postgraduates.

There is little evidence of clear benefits of postgraduate study to individuals in terms of career progress or financial rewards. The existing evidence is out-of-date and inconclusive.

Shortages are not currently an issue, even in technological areas. This is due mainly to the downturn in demand for high level skills and graduates generally which in turn is a consequence of the economic recession. This downturn has coincided with a period of increased supply. The main exception is in a few very specialist scientific areas where 'quality' is at a premium. Typically, this means difficulties for some companies in finding 'a few of the very best' researchers, in say synthetic organic chemistry, molecular biology or microelectronics, and for project leaders.

Looking to the future, it is expected that postgraduate supply will increase along current lines. This will be due to the growth in supply of first degree graduates qualified to enter postgraduate courses, and the relatively depressed state of the first degree job market which is likely to continue for the next year or so. The exact nature and composition of the supply will depend to a large extent on priorities given to different disciplines and levels by the Funding Councils, Research Councils and other government bodies, as well as individual universities which now have more independence to decide about their student intake levels.

On the demand side, future recruitment trends in the private sector will undoubtedly be linked to those for graduates in general. There is little evidence of any significant increase in demand for another year or two at least. Nor is there any evidence that more opportunities will become available, in general, for postgraduates than first degree graduates, in some kind of filtering down process. Demand for the 'super-specialists' in scientific and engineering areas is unlikely to increase significantly. It will be influenced, however, by a number of special factors, including international mobility and labour market trends in Europe and the USA, and multinational companies' research investment decisions. Growth in the public sector is unlikely, due to government expenditure constraints, but there are likely to be increased opportunities in higher education, especially in the social sciences if student numbers continue upwards.

Several areas are identified for future research priorities. In particular, it is recommended that improvements are made to the available data on first destinations of postgraduates where there are some serious deficiencies, for example: the absence of data in several places, notably the former polytechnic sector, for PgD students, and for those who fail to graduate (especially PhDs); and the need to distinguish

between home and overseas students, and between full-time and part-time studies. There is also a need to investigate utilisation/substitution issues relating to first and higher degree graduates in order to obtain a better understanding of employer requirements and market trends, in particular the 'quality' of jobs entered by postgraduates and the relevance of their qualification.

1. Introduction

1.1 Background

In the last few years there has been an unprecedented boom in the demand for higher education, despite the onset of the demographic downturn affecting the main entry group, 18 year olds. The number of students entering higher education has increased by over 50 per cent since 1986. Within this total, the number of postgraduate students has also increased. In 1989, over 50,000 higher degrees and postgraduate diplomas were awarded, an increase of almost 40 per cent over the decade. Recent growth in the supply of postgraduates from the universities has comfortably exceeded the growth in their first degree output. As a result, the percentage of postgraduates in the total university output has grown from 26 per cent in 1986 to 31 per cent in 1991.

It is only fairly recently that postgraduate education, and especially research training, has been given much attention in policy debates on UK skill requirements. Although the 1976 *White Paper on Postgraduate Education* (HMSO, Cmd.611) highlighted concerns at the time about the expanding needs of the new technological industries for high level skills and '...urged that resources for postgraduate education should be provided primarily in order to meet the country's needs for trained manpower...', policy interests continued to focus in two areas — higher education and science policy. Attempts to predict wider 'manpower needs' did not meet with much success, primarily because of the difficulties in obtaining reliable forecasts from employers and assessments from specialist academic committees (see for example the *ABRC Report, 1982*). The function of postgraduate training has been seen traditionally as mainly providing teachers and researchers in higher education, particularly the universities, and in the case of the natural sciences, industrial researchers.

During the 1980s not only has there been a substantial growth in output from postgraduate education, there have also been shifts in emphasis and a number of new training initiatives designed to make postgraduate education and training more relevant to the needs of employers, for example:

- The SERC's Collaborative Awards in Science and Engineering (CASE) and Link Scheme;
- Teaching Company Scheme (TCS), supported by DTI and SERC;
- New advanced courses such as the IT conversion type courses;

- High Technology National Training (HTNT) programme of intensive professional level vocational training mainly for unemployed people, funded by the Department of Employment.

Initiatives have also been introduced to improve its perceived image and quality (*eg* by improving submission rates especially in the social sciences) and the teaching of research techniques.

The wider graduate labour market, of which postgraduates form a small but increasing part, has also changed substantially during this period (see for example Pearson *et al.* 1989 and the *IMS Graduate Review* series). There was a rapid growth in demand for highly qualified and professional manpower from the mid-1980s onwards, particularly in the commercial sector, and shortage problems emerged during the late 1980s. These were more acute in the science and technology sectors. The economic recession of the early 1990s brought about a sea change. Demand plummeted, and graduate unemployment rose to record high levels (from five per cent of first degree university graduates in 1989 to an estimated 15 per cent in 1992). However, scientific, technical, engineering and R&D areas continue to cause resourcing problems for some employers in finding suitable graduate recruits, and there is a premium on 'quality' (*AGR Survey*, 1992).

There is evidence that postgraduates are entering a wider range of jobs than previously (*ie* not exclusively in higher education and industrial research) but there are marked differences in employer demand by discipline and level. In some disciplines a postgraduate, even a doctorate qualification, is a prerequisite for R&D appointments, while in others, postgraduates enter a similar range of jobs as first degree graduates. Many of the professions increasingly require a specialist postgraduate qualification on entry (*eg* librarianship, town planning, social work, law, teaching).

The real demand from employers, however, is notoriously difficult to assess (OECD, 1987; Winfield, 1987; SERC 1990; Prais, 1989, Pearson *et al.*, 1991). The recent Science White Paper (HMSO, 1993) acknowledges this but also emphasises the need for postgraduate research training to become more closely related to the needs of industry. It suggests where various changes are needed in its structure and content. Debate continues, however, on the wider role of postgraduate education and training. Supplying the needs of industry for highly qualified manpower is increasingly recognised as only one, albeit an extremely important one, of the overlapping roles of postgraduate education. It is also about contribution to the knowledge base and self improvement in terms of individual knowledge and skills (Blume, 1986).

1.2 The review

The postgraduate labour market has clearly altered over the last decade. It has been subject to many of the changes in the general graduate recruitment scene, as it is inexorably linked to the first

degree market, as well as the more direct influences highlighted above. In the future, it may develop in a different way, due to the many changes currently affecting it: *eg* changes within the higher education system itself (especially funding and institutional arrangements); the increased demand for postgraduate places from first degree graduates and others returning to higher education; the wider range of postgraduate training available including more modular courses and part-time studies; and changing employer and professional requirements for graduates generally.

The Employment Department has been a major funding source for masters and postgraduate diploma (PgD) courses in high technology areas. Since 1988 its High Technology National Training (HTNT) programme has provided several thousand awards annually on over 250 courses. In order to provide a context for the development of this programme, and also to gain greater understanding of trends in the supply and demand for postgraduates, the Department commissioned a review paper at IMS to present the available evidence and draw conclusions about future directions of the postgraduate labour market.

In the past, numerous studies have been undertaken of the demand for different kinds of postgraduates and there is a substantial set of data available on supply. Much of it, however, is focused on the higher end of the qualification spectrum, *ie* on PhDs, and on the university output. It is also somewhat out-of-date, considering the recent upheavals in the graduate market mentioned above, and the substantial growth in supply during the 1980s, especially in the non-university sector. It is also, arguably, of less relevance to the 1990s and the changes that are likely to affect the workings of the market in the 1990s and beyond.

In this review we have tried to concentrate on the most relevant data for today's situation, and used older sources only when little else was available. The scope was intended to be wider than just masters and PhD studies and to include PgD courses. These are often about vocational professional training (*eg* teaching, law) serving very specific markets, but also include training in subjects with more general applications (*eg* IT, business studies, management). Postgraduates qualifying at different levels often experience quite different initial employment experiences; and their labour markets are also different. In reality, however, the review focus had to be on higher degree graduates rather than diplomates, because of a lack of research evidence about the latter and, in particular, comparable statistics between the university and 'old' polytechnic and college sectors.

The review focuses on engineering and technology rather than covering all disciplines. This is partly because this is the main focus of the HTNT Programme but also because it is where more evidence exists of a discrete demand from employers, outside the academic sector, and where shortages of high level skills have been experienced in the past. However, it has been difficult, for the reasons stated above, to completely differentiate the postgraduate market within the total graduate market, and therefore some of the material presented covers both first and higher degree output. Where possible and

appropriate, the large number of overseas postgraduates have been excluded from the evidence presented, because the bulk of them return abroad after their studies and are therefore only rarely available on the UK labour market.

The review, undertaken between November 1992 and February 1993, involved the collection of evidence on the postgraduate labour market from:

- a literature search of published material;
- an analysis of graduate destination data from USR (special runs had to be requested);
- a review of other data sources, including the Research Councils, OST, Government surveys (*eg* LFS), professional bodies, AGR and AGCAS.

In addition, interviews with ten major graduate recruiters and two careers advisers at HEIs with large postgraduate populations were undertaken to get an up-to-date perspective on trends and issues in postgraduate recruitment. The recruiters covered the engineering, pharmaceutical, food and drink, chemicals, IT, consultancy, and public services sectors.

1.3 Structure of the report

The report is in six sections. It starts with a section on employment trends looking at the stocks of postgraduates in the population, both in and out of employment (Section 2). Section 3 focuses on the supply data covering output trends by discipline and level, and funding sources; and Section 4 deals with postgraduate employment destinations. Section 5 covers the demand from employers for postgraduates and skill shortage areas, and Section 6 discusses the initial experiences of new postgraduates in the labour market. Section 7 looks at future trends, covering supply projections and future employment prospects. Finally, Section 8 draws conclusions from the research findings, looks to future labour market directions and suggests research priority areas.

2. Employment Trends

2.1 Introduction

In this section we review the main data and information on the stocks of postgraduates in the population, both in and out of employment, and discuss the key trends in employment.

2.2 Data on stocks of postgraduates

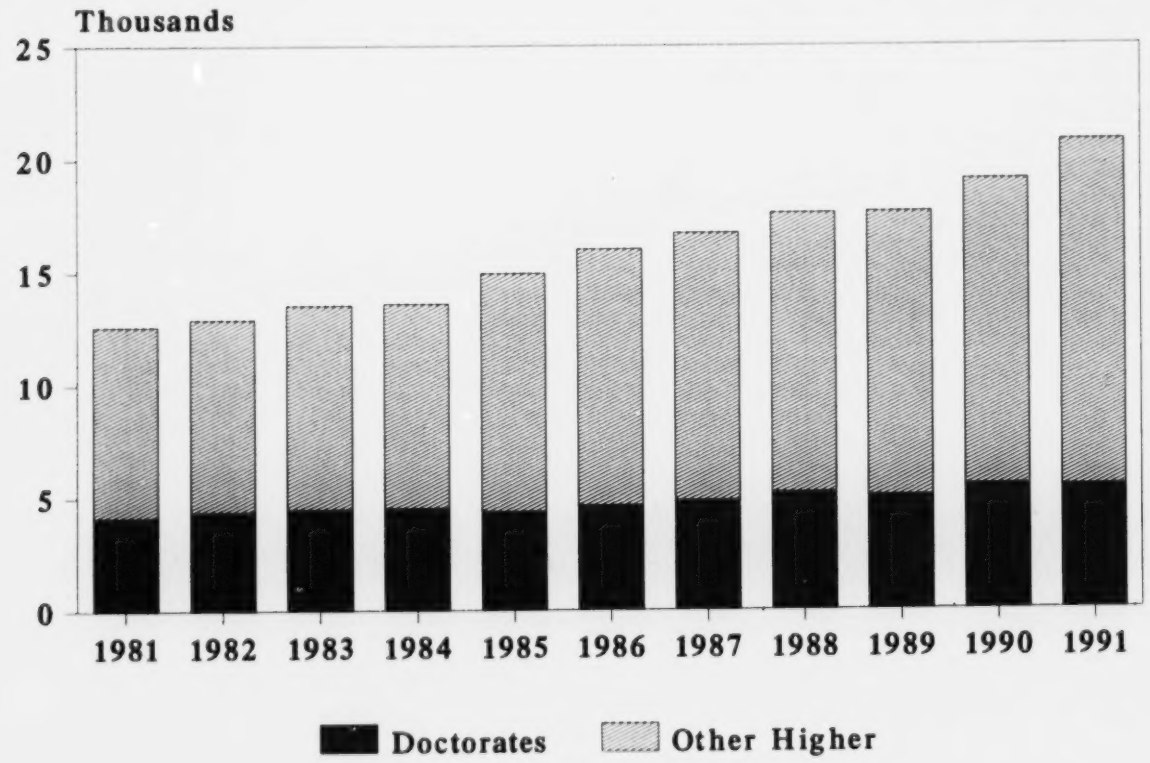
There are two main sources of data covering the numbers of people with postgraduate qualification in the UK: the Census of Population and the Labour Force Survey (LFS). The main problem with these statistical sources is that they do not distinguish between doctorates, masters or postgraduate diplomas. This lack of distinction is in line with the ISCED (International Standard Classification of Education) (UNESCO, 1975), and was realistic and practical when the numbers involved were relatively small. It has become increasingly evident, however, that each of these different levels of postgraduate education have different labour markets, which causes problems when using this data for market analysis. Recent OECD recommendations, such as the redrafted Frascati Manual (OECD, 1992), suggest disaggregating this postgraduate category. We also understand that OPCS have coded masters and PhDs separately in the forthcoming 1991 Census data, but that this distinction will not be made in the published reports. Where possible in this chapter the distinction has been drawn.

2.3 The census of population

The 1991 Census volume dealing with Qualified Manpower (QM) is due to be published in early 1994, and therefore no up-to-date information on postgraduate employment will be available for another 12 months at least. We understand the delay is because the QM volume is based on a ten per cent sample and thus only processed once all the '100 per cent data' have been analysed. This means that the most recent available Census data are for 1981 and therefore considerably dated and of questionable relevance to today's manpower scene (OPCS, 1984). Even when the 1991 data become available they will relate to a period three years earlier.

The 1981 Census indicated that there were 19,741 people with higher degrees[2] in their 10 per cent sample, which in turn suggests a population estimate of just under 200,000. This represented 9.5 per cent of all graduates in the population, and 0.5 per cent of the total population. Between 1981 and 1991 a further 52,000 PhDs and 123,000 other higher degrees (mainly masters) have been awarded by universities to home students (see Figure 2.1); and the Council for National Academic Awards (CNAA) has awarded approximately 20,000 higher degrees over this period (see Figure 2.2). A further 60,000 at least have gained a postgraduate teacher training award (PGCE). In all, this suggests that as many people have received higher degrees and diplomas in the ten years since the 1981 Census as had them in 1981. This illustrates how out-of-date the 1981 Census data may have become, and the importance in terms of labour market analysis of those recently graduating with higher degrees.

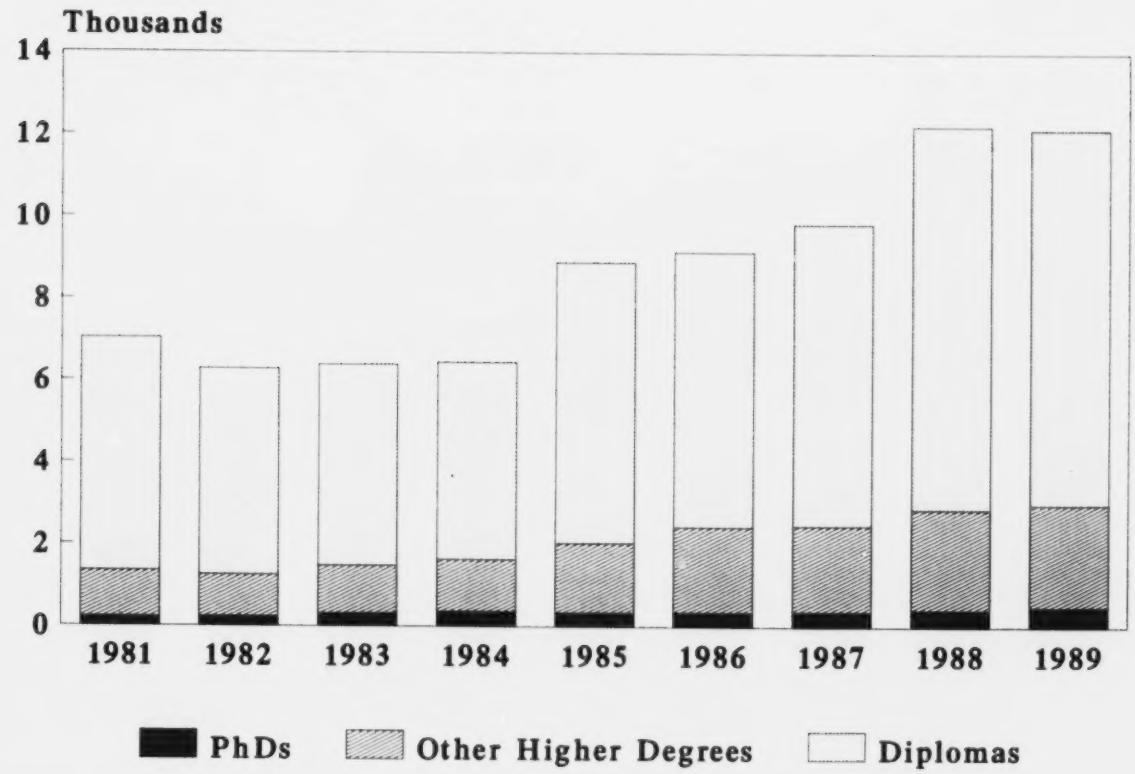
Figure 2.1 Doctorates and other higher degrees awarded to UK domicile students from universities 1981-1991



Source: IMS/USR

[2] Here 'higher degree' covers all programmes for which a first degree or equivalent is an essential entry qualification, including both vocational courses (*eg* PGCE one year teacher training course) and MSc/PhD/DPhil courses or research. It is an ISCED compatible definition.

Figure 2.2 CNAA postgraduate awards 1981-1989



Source: IMS/CNAA

Despite these problems, the 1981 data is the most recent comprehensive database available. An example of the type of information that will be available from the 1991 Census QM Volume in 1994 is given in Table 2.1, but showing the 1981 data. (Nb when interpreting Table 2.1 the numbers should be multiplied by ten to obtain population estimates.)

From Table 2.1 it is evident that the single largest group of higher degree graduates in employment was in the science disciplines (32 per cent of the total). Science higher degree graduates were almost twice as numerous in employment as those in engineering and technology. Also, the ratio of higher degree to first degree graduates in science is much higher (around 1:3) than in engineering and technology (about 1:10). This illustrates an important historical difference between the balance in output and employment demand for science compared to engineering, which is discussed in later chapters. Social, administration and business studies higher degree graduates formed a slightly larger group than engineers/ technologists, but the ratio of higher to first degree qualifications was slightly lower among the former.

Table 2.1 Numbers of higher and first degrees in employment, and employed by industry by subject group, from the 1981 census qualified manpower tables

	higher degrees in employment	first degrees in employment	higher degrees employed by industry	first degrees employed by industry
Science Subjects	5,374	17,268	1,079	16,870
Engineering and Technology Subjects	2,452	27,674	1,413	6,348
Education	1,113	24,912	15	1,241
Health, Medicine & Dentistry	1,348	12,756	66	2,447
Agriculture, Forestry & Veterinary	277	1,627	60	680
Social Administration & Business Studies	2,885	36,223	552	10,912
Vocational	634	6,559	88	1,440
Languages	1,107	9,996	75	1,928
Arts (other than language or performing arts)	867	6,151	57	946
Music, Drama & Visual Arts	357	5,294	48	940
All subjects (including not stated)	16,796	148,747	3,783	44,151

Source: IMS/1981 Census

Table 2.2 1981 census economically active higher degree males and females by subject group

	Male	Female	% Female
Education	875	268	23.4
Health, Medicine & Dentistry	1102	270	19.7
Technology & Engineering	2422	82	3.3
Agriculture, Forestry & Veterinary	246	47	16.0
Science (inc. Maths & Applied Science)	4793	707	12.9
Social, Administration & Business	2389	559	19.0
Vocational	516	132	20.4
Language	775	378	32.8
Arts	706	193	21.5
Music, Drama & Visual Arts	249	134	35.0
Not Stated	290	123	29.8
All Subjects	14363	2893	16.8

Source: IMS/1981 Census

A minority of economically active higher degree graduates in 1981 were women (16.8 per cent). This percentage ranged from 3.3 per cent of engineering and technology higher degree graduates to 32.8 per cent in languages and 35.0 per cent in the visual arts, music and drama (Table 2.2).

Focusing on employment in industry, we see from Table 2.1 that it accounted for only about one in five of all higher degree graduates in employment compared with almost one in three of first degree graduates. The main focus of industrial employment is science and engineering/technology disciplines; and here the numbers from each group were roughly equal.

2.4 The Labour Force survey

A more up-to-date source of data on the employment of higher degree graduates is the Labour Force Survey (LFS). The LFS, first carried out in 1973, has been an annual survey since 1984 and is now (since 1992) a quarterly survey. The most recent survey data available are based on interviews with over 60,000 households during the March to May 1992 quarter. As with the published Census data, the highest qualification variable only distinguishes between higher degrees and first degrees. The data presented in the next few tables are based on analysis of the 1992 May to March sample, using the Quanvert package. The figures given are UK population estimates based on the sample and on the known sampling rates.

Table 2.3 below shows the percentage of the workforce in each sector which has a higher degree or a first degree as their highest qualification. Overall, 7.3 per cent of the 1992 workforce had a first degree as their highest qualification, while 2.3 per cent had a higher degree (see Note 2 at foot of page 14), representing about 580,000 individuals. As almost all of those with a higher degree would also have a first degree, the percentage of degree qualified people in the workforce is approximately nine per cent. The LFS and 1981 Census are not directly comparable, but they do provide evidence that postgraduate employment has grown significantly over the decade, and confirm the suggestion made earlier from the HE output statistics that it is very likely to have doubled in size. Higher degree graduates now represent about one in four of the total graduate population in employment compared to a figure of nearer one in ten years ago.

The pattern of graduate employment is uneven across industrial sectors: for example, over 16 per cent of employees in the financial services sector, nearly twice the average, have at least a first degree, compared with three per cent of employees in each of 'agriculture' and 'hotels/distribution'. The financial services sector also has a higher than average percentage of higher degree graduates (3.2 per cent), but the 'other services' sector (which includes education) has the highest level at almost five per cent. The 'energy and water supply' and 'mineral extraction' sectors also have slightly higher than average percentages with higher degrees.

Table 2.3 First degree and higher degree graduates as a percentage of the workforce by sector from the 1992 (May-March) labour force survey

SIC Industry Division	All employees	% of employees with a 1st degree	% of employees with higher degree
Agriculture *etc.*	568,373	2.49	0.76
Energy & Water supply	519,213	9.68	2.50
Mineral Extraction *etc.*	746,620	6.90	2.98
Metal Goods *etc.*	2,497,034	5.93	1.42
Other Manufacturing	2,147,156	3.50	0.83
Construction	1,774,224	2.74	0.61
Hotels Distribution *etc.*	5,184,395	2.62	0.45
Transport & Communications	1,596,786	3.00	0.59
Financial Services	2,865,760	13.54	3.18
Other Services	.7,379,618	11.73	4.76
NA/inadequately described	67,376	6.66	2.62
Total	25,550,901	7.26	2.31

Source: IMS/LFS

As will be shown in Chapter 5 the financial services sector has become a more important recruiter of graduates over the last decade, intakes increasing by almost 140 per cent between 1979 and 1989. There has also been a major growth in MBAs here. Most entrants to school teaching now have a BEd degree or a PGCE. It is estimated that approximately 30 per cent of secondary teachers hold postgraduate qualifications, (mainly MSc and PGCEs) (Bevan S, 1991), and the majority of university academics have a PhD or MSc/MPhil, which together account for the high figure in the 'other services' sector.

Table 2.4 gives a similar analysis of the LFS data but broken down by major occupational group. As would be expected, graduates are concentrated in the professional and associate professional occupations. Approximately half of those employed in the professional occupations category have at least a first degree, and almost one in six have a higher degree, a reflection of both the increasing 'graduatisation' of professions generally, and the increase in for postgraduate entry qualifications in some professions (*eg* Law, planning). This is discussed further in Chapter 5.

Table 2.4 First and higher degree graduates as a percentage of the workforce by occupation from the 1992 (May-March) labour force survey

	All employed	% of employed with first degree	% of employed with higher degree
Managers & Administrators	3,856,587	9.82	2.74
Professional Occupations	2,549,409	36.35	14.47
Associate Professionals	2,255,288	12.97	3.28
Clerical & Secretarial	3,974,437	2.75	0.38
Craft & Related	3,574,392	0.90	0.12
Personal & Protective	2,470,611	1.39	0.09
Sales Occupations	2,055,694	2.32	0.46
Plant & Machine Operatives	2,428,865	0.58	0.10
Other Occupations	2,269,931	0.56	0.06
Total	25,550,903	7.27	2.31

Source: IMS/LFS

2.5 Postgraduate unemployment

Despite the current relatively high unemployment levels of newly qualified first degree graduates (see Chapter 5), the LFS data show that graduates in the population are much less likely to be unemployed than others. Table 2.5 gives details of the employment status of all economically active people with first and higher degrees compared with the population as a whole. First degree graduates are slightly more likely to be unemployed than higher degree graduates, while all graduates are approximately half as likely to be unemployed than the general population. The small numbers of unemployed graduates in the LFS sample render further analysis inappropriate.

Table 2.5 Relative unemployment and self-employment rates by level of highest qualification from the 1992 (May-March) labour force survey

	All economically active	Economically active with a first degree	Economically active with a higher degree
Employed	79.07	83.00	83.39
Self-Employed	11.31	12.43	12.73
Unemployed	9.62	4.56	3.88
Base	28,403,587	1,948,501	615,255

Source: IMS/LFS

2.6 International comparisons

There is a major classification problem with international comparisons of postgraduate education. Many countries prefer to aggregate ISCED Level 6 (university first degree level) and ISCED Level 7 (university postgraduate level) given the nature of their tertiary education system. An example of this aggregation is to be found in a recent OECD publication comparing education systems of OECD countries (OECD, 1992b). This publication contains the internationally comparable statistics shown in Table 2.6.

Table 2.6 Internationally comparable 1989 statistics of tertiary level education

	% of population aged 25 to 64 qualified to ISCED 6/7	Number of women aged 25 to 64 per 100 men qualified to ISCED 6/7
Canada	15	78
United States	23	81
Australia	10	61
Japan	13	25
New Zealand	9	67
Austria	5	62
Belgium	7	43
France	7	63
Germany	10	52
Ireland	7	65
Netherlands	6	39
Switzerland	9	45
United Kingdom	9	55
Italy	6	73
Portugal	4	78
Spain	9	84
Denmark	10	61
Finland	10	62
Norway	11	77
Sweden	12	87

Source: OECD

These comparisons show that the UK is in the mid-range of countries in terms of the proportion of the population to have received a university level tertiary education. However, it has a relatively low

level of tertiary education amongst women. Since 1989 the latter should have improved slightly with improved participation rates, especially for women. An earlier OECD publication specifically examined the postgraduate sector (OECD, 1987) but the authors found it extremely difficult to obtain comparable international statistics. The report identified a common standstill in the numbers of people obtaining PhDs and their employment levels throughout the OECD during the 1980s. This was a result of a combination of demographic downturns and constraints on public expenditure. This pattern applied especially to the humanities and social sciences, where there appeared to be few other employment prospects.

The United States which has the highest level of first degree graduates has seen a rapid rise in the numbers of masters degrees awarded. The number of masters degrees awarded in 1990 was four times the number awarded in 1960 (Casanova *et al.*, 1992). This increase was linked to a new role for advanced degrees, as career oriented rather than as a stepping stone to a PhD. As will be shown in later sections, a similar pattern may be developing here.

2.7 Summary

The data currently available on the stock of postgraduates in the labour market are extremely patchy and most of them are out of date. The available Census data relate to 1981, while the more up to date Labour Force Survey data are based on a relatively small sample and do not sustain detailed disaggregation. The combination of 1981 Census data and the last tens years' output of higher degrees suggests that at least 50 per cent of all people with postgraduate qualifications in the labour market have qualified in the last ten years. The majority of postgraduates are in professional occupations. They are mainly concentrated in the financial services and education sectors. This doubling of employment of people with postgraduate qualifications has mainly taken place since 1984, and is focused at masters and PgD levels. However, we will have to wait until the new more detailed 1991 Census data become available to obtain confirmation of this trend and analysis. The unemployment rate of postgraduates is much lower than in the population as a whole, and lower than for new graduate entrants to the labour market. International comparative data on the employment of postgraduate qualified people are limited.

3. The Expanding Supply of Postgraduates

3.1 Introduction

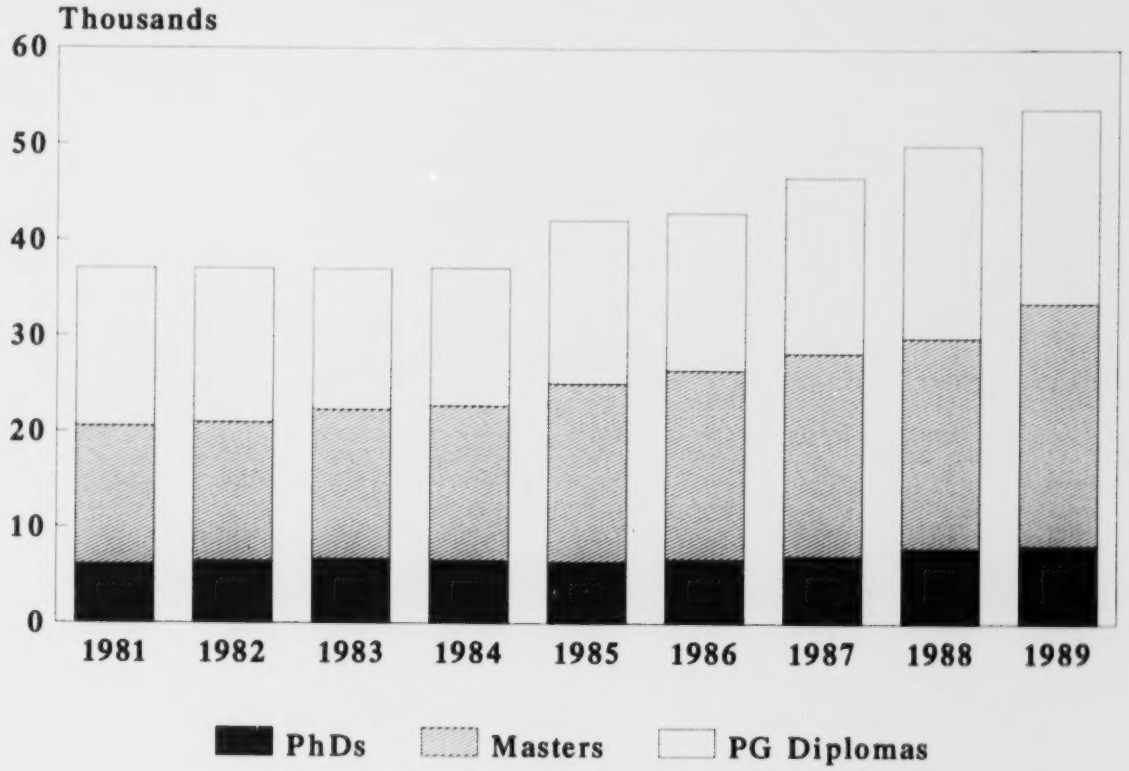
This chapter examines the growth in postgraduate output over the last ten years, based on a range of data sources. The chapter that follows focuses on their initial employment.

3.2 Output data

Before discussing the output data analysis, we feel it is worth highlighting some important points about data availability and compatibility of different sources. In order to look at the output of postgraduates it is simplest to disaggregate the data first by level of qualification then by subject. Most of the data sources can be split in this manner as well. There are, however, problems with these data sources. There are now three different sources covering the universities' outputs, all of which produce slightly different numbers, and two of these are not directly compatible sources of information about the former polytechnics and colleges of HE. Therefore, throughout this Chapter reference will be made to the specific sources being used and where possible explanations of the inconsistencies between sources will be given. Another problem is in terminology: the former polytechnics and colleges (CNAA) data deal with doctorates, other higher degrees and higher diplomas; the university (USR) data deal with doctorates, masters and postgraduate diplomas; while the Research Councils refer to research students (PhDs) and taught or advanced course students (MScs).

The majority of published data produced by the USR simply distinguishes higher degrees from first degrees, however the 'Red Book' *University Statistics Volume 1*) gives some data broken down to doctorate, other higher degree, higher diploma and professional teaching qualification levels. We obtained a special breakdown from the USR of the First Destination Statistics (FDS), separately analysing doctorates and other higher degrees (presented in Chapter 4). A problem with comparing these two USR sources of data is that the 'Red Book' data is based on the calendar year, while the FDS data is based on the academic year of October to September. The CNAA in their Annual Reports give details of the number of doctorates, masters and postgraduate diplomas awarded that they have validated. These data are based on the calender year, and cover the bulk of postgraduate awards made by the former polytechnics and colleges of higher education.

Figure 3.1 CNAA & universities doctorates masters and postgraduate diplomas* 1981-1989



* includes PGCEs

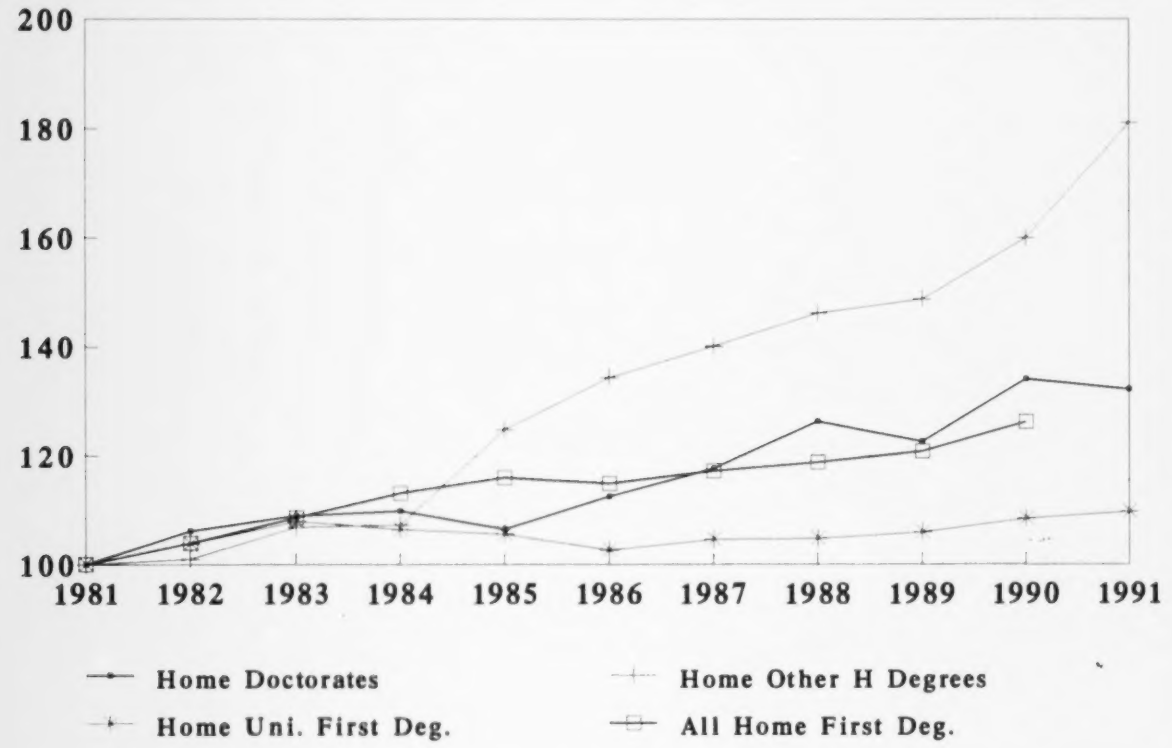
Source: IMS/USR/CNAA

Bearing in mind the problems of slightly different time periods described above, Figure 3.1 shows the combined university and CNAA validated postgraduate output from 1981 to 1989. The number of doctorates has remained constant while the output of masters and postgraduate diplomas (PgDs) has grown over the period. The dip in the numbers of PgDs awarded around the mid 1980s was almost totally due to a reduction in the number of PGCEs, which represents a major part of the output at this level.

A problem, however, with these data, are that they include overseas students. The published CNAA data and the old USR 'Red Book' data make no distinction between UK domiciled students and overseas students. However, the USR FDS data does but only at the aggregate level and only for doctorates and other higher degrees. Overall, 35 per cent of doctoral and 40 per cent of other higher degree (mainly masters) university graduates were from overseas in 1991.

When the home student data are examined separately, a more dramatic pattern of growth emerges, as shown in Figure 3.2. Unfortunately this trend analysis can be undertaken only for the university data.

Figure 3.2 Growth of home university doctorates, other higher degrees, PG diplomas and first degrees 1980 as base 100



Source: IMS/USR

In Figure 3.2 the growth in *home* output of university doctorates and other higher degree and diploma students is compared with the growth in *home* output of university first degrees, using 1980 as a base of 100. The number of home postgraduates is particularly important when examining the UK labour market as the bulk of overseas students return home after completing their studies.

Figure 3.2 shows that between 1981 and 1985 the output of home university doctorates grew at approximately the same pace as the output of home first degrees from universities. Since 1985 there has been more growth in doctorates. The most noticeable pattern of growth is in other higher degrees (mainly MSc/MBA/MPhils) which started to increase rapidly from 1984, jumping up particularly between 1984 and 1985. PgD output from universities has grown at about the same rate as doctorates.

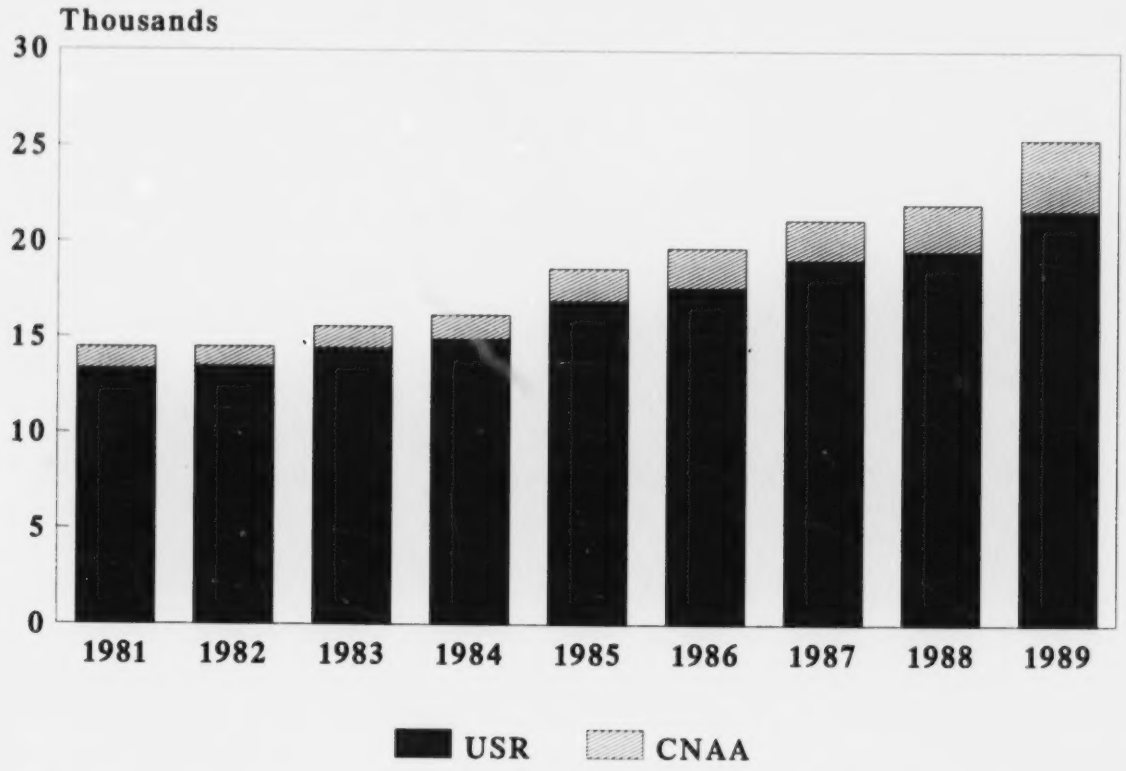
The next sections examine the patterns of growth in more detail, starting with the growth in other higher degrees (which will be referred to as masters from here onwards), as these are the most numerous and have shown the most rapid growth. Doctorates are discussed next, and then postgraduate diplomas.

3.3 Masters degrees

3.3.1 Universities/CNAA

As we have already shown, masters degrees represent the largest postgraduate group, and main growth area. The vast majority of masters graduates emerge from the universities, although the CNAA has been awarding a growing number of masters degrees: 3,696 in 1989 compared to 1,120 in 1981 (Figure 3.3). The non-university sector output has thus grown from 7.8 to 14.6 per cent of all masters degrees awarded. The universities awarded almost 22,000 masters degrees in 1989, an increase of over 60 per cent since 1981.

Figure 3.3 CNAA & universities masters degrees



Source: IMS/USR/CNAA

3.3.2 Subject group

Table 3.1 shows the growth of output of university masters degrees by subject group. The data is based on our special tabulation of USR FDS and includes overseas students. As with first degrees, the pattern of growth has been uneven, with subjects allied to medicine growing

by about 200 per cent between 1980 and 1991, while engineering/ technology has only grown by 27 per cent. The overall growth rate (all subjects) was 97 per cent.

Table 3.1 Growth in the number of other higher degrees awarded by universities 1980, 1987 and 1991 by subject group

Subject group	1980	1987	1991	% growth 1980 to 1991
Medicine	511	781	1,008	97.3
Allied to Medicine	217	468	665	206.5
Biology	481	667	952	97.9
Veterinary Science *etc.*	349	349	593	69.9
Physical Sciences	871	936	1,141	31.0
Mathematical Sciences	612	1,048	1,524	149.0
Engineering and Technology	2,204	2,850	2,792	26.7
Architecture & Related	381	567	567	48.8
Social Sciences	2,086	3,140	4,660	123.4
Business & Administration	1,639	2,742	4,580	179.4
Library & Information	–	347	496	–
Languages & Related	904	1,143	1,575	74.2
Humanities	438	756	1,215	177.4
Creative Arts	162	188	275	69.8
Teacher Training	2,014	3,008	3,169	57.3
Multi-Disciplinary	232	449	612	163.8
All subjects	13,101	19,439	25,824	97.1

Source: IMS/USR

Some of this growth can be explained by growth in specific subjects, for instance the growth in subjects allied to medicine is mainly explained by a growth in nursing postgraduate qualifications. The growth in business and administration, likewise, is accounted for by a growth in MBAs. Elsewhere, there has been the development of new types of courses. This includes computer studies within the ambit of mathematical sciences, and new initiatives such as the new conversion-type IT advanced courses which began in 1983 (see paragraph 3.6 on the IT initiative) and the Employment Department HTNT programme from 1988. The growth in social sciences, humanities and multi-disciplinary areas reflects a parallel growth in these areas at first degree level.

A possibly worrying feature is the lower rate of growth in engineering and physical sciences. This means that engineering, which represented 17 per cent of all other higher degrees in 1980, dropped

to only 11 per cent by 1991. This may reflect the reported decline in quality of engineering first degree entrants (Meikle, 1992), which may have led to a decline in the number of postgraduate entrants of sufficient quality. It is also likely to be related to consistent high employer demand and shortages at first degree level making postgraduate study a less attractive option for engineering first degree students than entering employment directly after graduation, compared with other disciplines.

3.3.3 Overseas students

As noted in paragraph 3.2, overseas students represent a significant number of masters level graduates (40.2 per cent in 1991). The FDS data do not allow the numbers of overseas students to be directly calculated by subject group, but by subtracting the number of overseas students leaving the UK an estimate can be obtained. However, as Table 3.2 indicates, only 31.4 per cent of the masters output were overseas student leaving the UK in 1991, while 40.2 per cent in total were overseas students. The main reason for this discrepancy is that some masters level students proceed onto further study (mainly PhD). Indeed, in many universities it is a requirement for some PhD courses.

Subjects with higher than average proportions of overseas students are veterinary science, engineering and social science. The lowest include mathematics, physical sciences, biology, education, creative arts and humanities.

3.3.4 Women

Women represent a growing but still minority share of the university masters degree output. In 1991, 37 per cent were women. This percentage varies considerably by subject group. It is highest in traditionally female dominated employment areas such as education (51 per cent), subjects allied to medicine (mainly nursing, 56 per cent) and library and information (64 per cent); and is lowest in engineering and technology (11 per cent). (See Table 4.2 for further details of this subject breakdown.)

Table 3.2 Number of university other higher degree graduates returning overseas in 1991 by subject group

Subject group	1991 graduates	Overseas students leaving UK	% returning overseas
Medicine	1,008	342	33.9
Allied to Medicine	665	170	25.6
Biology	952	228	23.9
Veterinary Science *etc.*	593	348	58.7
Physical Sciences	1,141	254	22.3
Mathematical Sciences	1,524	363	23.8
Engineering and Technology	2,792	1,063	38.1
Architecture & Related	567	202	35.6
Social Sciences	4,660	1,867	40.1
Business & Administration	4,580	1,529	33.4
Library & Information	496	166	33.5
Languages & Related	1,575	466	29.6
Humanities	1,215	278	22.9
Creative Arts	275	37	13.5
Education	3,169	636	20.1
Multi-Disciplinary	612	154	25.2
All subjects	25,824	8,103	31.4

Source: IMS/USR

3.4 Doctorates

The labour market for doctorates (*ie* PhD/DPhil graduates) although much smaller than the market for other postgraduate qualifications, is very important for specific sectors and therefore worthy of separate attention.

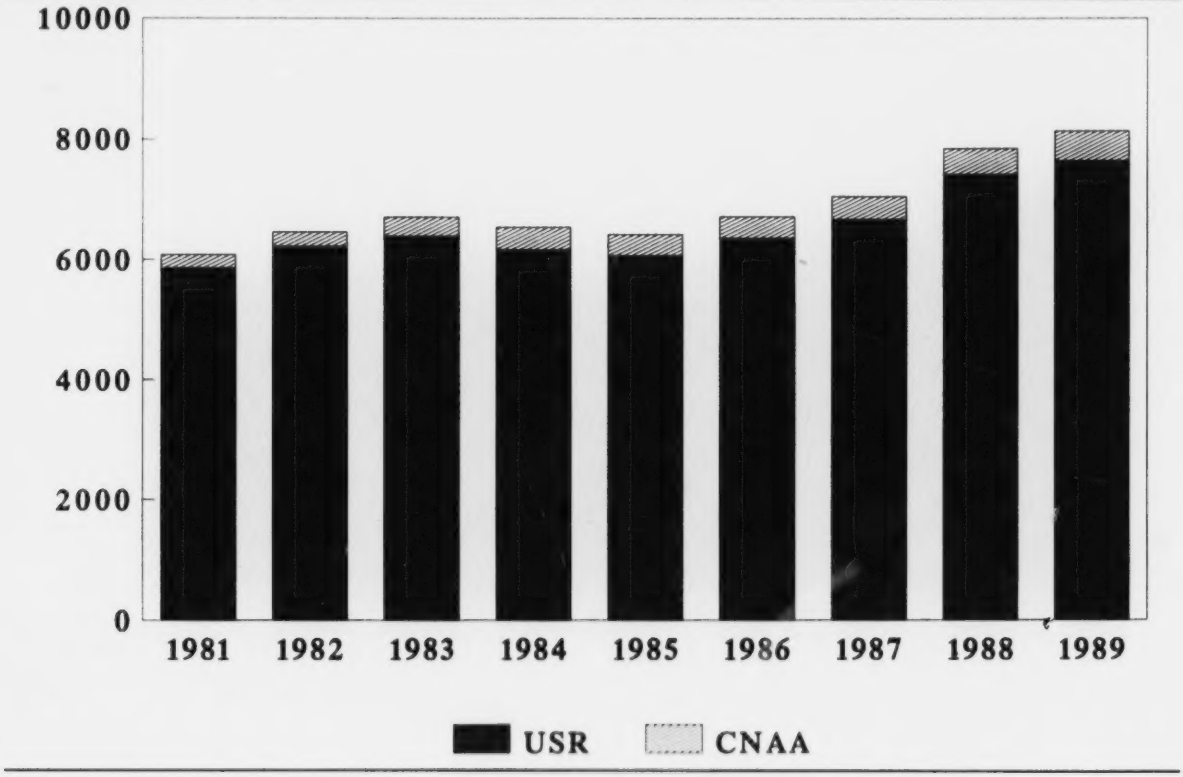
3.4.1 Universities/CNAA

Figure 3.4 shows the growth in output over the last ten years from the university and CNAA systems.

This shows the predominance the universities, accounting for over 90 per cent of the 8,000 PhDs/DPhils awarded in 1989. Although the CNAA percentage has increased from 3.6 in 1981 to 6.0 in 1989 it is still much lower than the equivalent percentage at masters level (see para 3.3.1). Another feature of doctoral output is its the relatively low

growth (34 per cent between 1981 and 1989) compared with masters degrees (76 per cent).

Figure 3.4 CNAA & university doctorates



Source: IMS/USR/CNAA

3.4.2 Subject group

Table 3.3 shows a breakdown of the growth in PhDs/DPhils from universities between 1980 and 1991 by subject group. This shows that the overall the rate of growth at this level, as well as being slower, has also been more even than at masters level. A notable feature is the decline in business and administration, but this is probably due to the growing acceptance of MBA qualifications in recent years, which means that people are more likely to enter the labour market at that level rather than pursue a PhD.

Equally, this area is relatively less well covered by funding agencies, and therefore most MBA students are self or employer-funded which in turn leads to an early return to the labour market.

Subjects allied to medicine, mathematical sciences, architecture and related subjects and the humanities have all experienced relatively high growth rates. In the case of the allied to medicine group this is due to growth in subjects other than nursing, unlike at masters level where this accounted for the bulk of expansion subjects (see

paragraph 3.3.2). The main reason for the increase in mathematical sciences is the emergence of computer studies, which did not exist as a separate subject classification in 1981 but by 1991 represented almost 50 per cent of all those in the subject group. The growth in architecture and related subjects is based on a relatively small starting number and across-the-board increases. The growth in humanities is another case of across-the-board increases.

Table 3.3 Growth in the number of PhDs awarded by universities 1980, 1987 and 1991 by subject group

	1980	1987	1991	% growth 1980 to 1991
Medicine	430	364	517	20.2
Allied to Medicine	182	345	357	96.2
Biology	947	1,155	1,248	31.8
Veterinary Science	176	206	232	31.8
Physical Sciences	1,467	1,484	1,730	17.9
Mathematical Sciences	264	337	503	90.5
Engineering & Technology	1,005	1,169	1,447	44.0
Architecture & Related	37	68	65	75.7
Social Sciences	569	662	702	23.4
Business & Administration	235	139	131	-44.3
Library & Information	–	9	27	–
Languages & Related	378	356	429	13.5
Humanities	261	428	482	84.7
Creative Arts	52	29	47	-9.6
Teacher Training	145	215	206	42.1
Multi-Disciplinary	47	66	77	63.8
All subjects	6,195	7,032	8,200	32.4

Source: IMS/USR

3.4.3 Overseas students

As with masters degrees, a large number of doctorates are obtained by overseas students, which can distort the figures. Similarly, there are no clear data available which show the breakdown of overseas students by subject groups. Therefore Table 3.4 gives the number of overseas student leaving the UK after their course as a proxy for the numbers of overseas students. These figures are necessary under-estimations as some overseas students stay in the UK either in employment or in post-doctoral research studies. The overall figures indicate that 35.2 per cent of doctoral graduates were from overseas,

which compares with the 25.4 per cent of graduates returning overseas. As with the data on masters degrees, where possible the distorting effect of overseas students has been reduced by subtracting those returning overseas from the known total. Table 3.4 shows that the main concentrations of overseas students are found in engineering, social sciences and business studies and some of the smaller disciplines such as veterinary science, architecture and library and information work.

Table 3.4 Number of university doctorates returning overseas in 1991 by subject group

Subject group	1991 doctorates	Overseas students leaving UK	Per cent returning overseas
Medicine	517	91	17.6
Allied to Medicine	357	58	16.2
Biology	1248	233	18.7
Veterinary Science *etc.*	232	103	44.4
Physical Sciences	1730	287	16.6
Mathematical Sciences	503	135	26.8
Engineering & Technology	1447	455	31.4
Architecture & Related	65	31	47.7
Social Sciences	702	267	38.0
Business & Administration	131	51	38.9
Library & Information	27	13	48.1
Languages & Related	429	138	32.2
Humanities	482	118	24.5
Creative Arts	47	6	12.8
Teacher Training	206	69	33.5
Multi-Disciplinary	77	24	31.2
All subjects	8200	2079	25.4

Source: IMS/USR

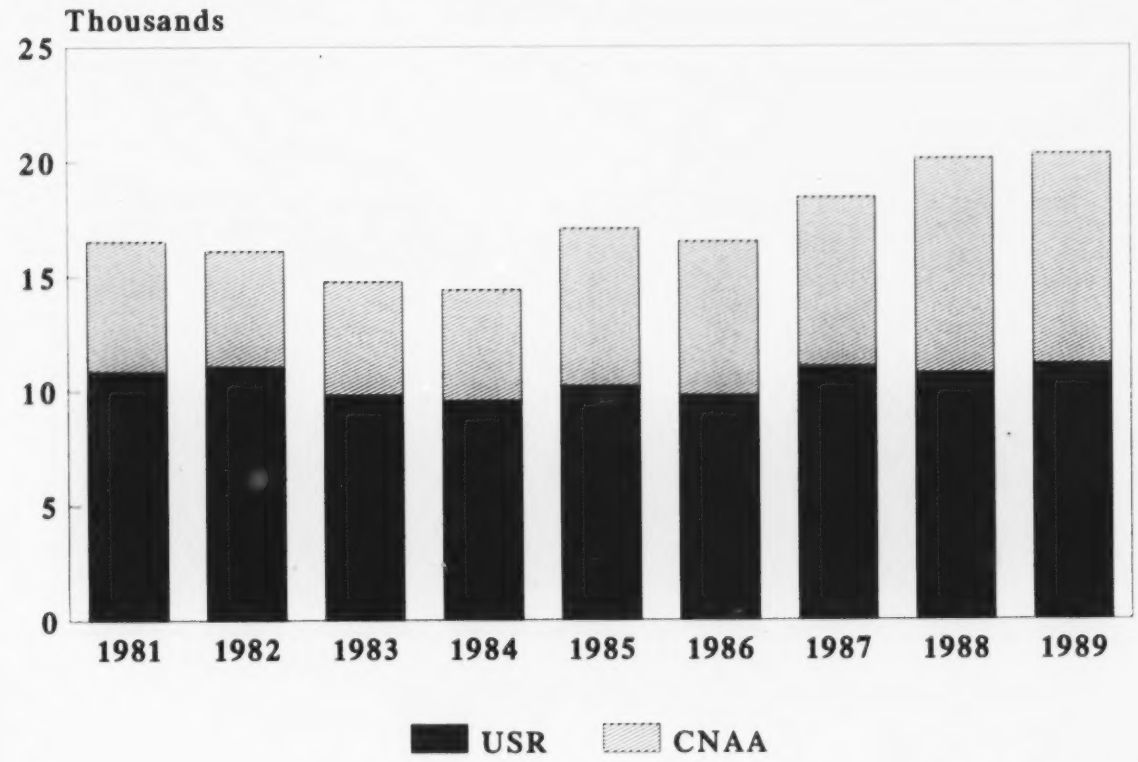
3.4.4 Women

Women represent only one in four of the PhD output. As in the case of masters level output, the female percentage is higher in education (40 per cent) and medicine (38 per cent). It is also higher than average in languages and related subjects (41 per cent). The female percentage is lowest in engineering and technology (10 per cent).

3.5 Postgraduate diplomas (PgDs)

There is a wide range of postgraduate diplomas. Post Graduate Teacher Training Diplomas (*ie* PGCEs) make up the largest single group; others include diplomas in other professional areas such as management studies, planning, social work, *etc.* and a series of vocationally orientated diplomas such as IT and engineering manufacture. Figure 3.5 shows the growth in output of PgDs over the last ten years. Nearly half of PgDs have been awarded by CNAA accredited bodies: in 1989 the CNAA awarded approximately 9,000 compared with 11,000 at universities. Most of the growth has taken place in the former polytechnic and college sector especially in the last few years.

Figure 3.5 CNAA & universities postgraduate diplomas



Source: IMS/USR/CNAA

Unfortunately, no further detailed data is available from the USR. The CNAA data on awards from polytechnics and colleges provide an indication about universities' output of the various areas of growth, as shown in Table 3.5. Overall numbers have almost tripled between 1980 and 1989, but there have been different trend patterns for different awards. PGCEs doubled between 1980 and 1981, and jumped up again between 1987 and 1988. Postgraduate Diplomas (general)

increased sharply between 1984 and 1985, and Diplomas in Management Studies have shown an erratic growth pattern.

Table 3.5 CNAA accredited postgraduate diplomas 1980-1989 by type

	Postgraduate Diplomas	Postgraduate Certificate in Education	Diploma in Management Studies	Diploma in Professional Studies in Education	Diploma in Professional Studies in Nursing
1980	821	983	1395	22	0
1981	1123	1947	2477	149	7
1982	1289	1795	1653	297	0
1984	1090	1768	1524	441	3
1985	1960	1992	1930	969	21
1986	1760	1822	2089	962	93
1987	2119	2129	2062	956	110
1988	2477	3188	2564	959	178
1989	2410	3151	2562	856	197

Source: IMS/CNAA

The total numbers in receipt of PGCEs are much larger than those shown in Table 3.5 — approximately 13,000 graduated, mainly from universities, in 1991. Entrants to PGCE courses declined between 1988 and 1990, mainly due to a downturn in applications. Recent changes to the graduate job market, together with the success of promotional campaigns (TASC) and special bursary schemes, have meant that numbers have picked up, and are expected to be higher again in 1993. Half of PGCE students are women.

3.6 Factors leading to growth in postgraduate output

There are a number of interrelated factors underlying the growth trends in the previous sections, which it is useful to summarise here, before moving on to the next chapter which deals with employment trends.

Most assessments of the supply of graduates, both first degree and higher degrees, start from demography. Currently, there is a decline in the number of eighteen year olds, which superficially should lead to a decline in the numbers entering higher education. However, both the proportions of eighteen year olds who are children of Social Class I and II, and children of earlier graduates, are rising. Both of these factors predispose towards entry to higher education partially explaining the current rise in those entering higher education. Other influences include the effect of the recession on alternative

employment opportunities, government policy which has encouraged higher education institutions to increase their student intakes, and growth in mature students. Some institutions have given more priority to increasing numbers at postgraduate rather than first degree level.

The numbers of people completing first degrees is obviously an important precursor, and hence predictor, of the numbers taking higher degrees. Over the last few years the number of first degree graduates has increased significantly, mainly due to the factors mentioned above. The economic recession, however, has meant that there are fewer job opportunities for the increased number of first degree graduates. This in turn has led to a recent growth in demand for postgraduate places (though its full impact is not yet seen in the supply figures). Evidence from previous periods of economic boom suggest that when attractive jobs at the first degree level are available, demand for postgraduate courses drops. This pattern was clear with IT during the mid 1980s (Connor & Pearson, 1986) and was also evident for engineering in the late 1980s (SERC 1990).

Another important factor in boosting postgraduate output has been career requirements. Increasingly, many professional bodies are making a postgraduate qualification virtually a prerequisite for entry *eg* law, education, personnel management. There is also much greater emphasis being given to more formal postgraduate study in management training, in particular engineering management, and as part of individual professional development plans within companies. This has clearly been a major influence on the growth at masters and diploma levels.

Finally, the take up of postgraduate courses has been affected by the availability of funding. This is dealt with in the final section of this chapter. There was a very obvious leap in the number of funded places on masters courses between 1983 and 1984. Which can be traced to a virtual doubling of the number of SERC advanced course studentships. These were funded through the IT initiative and SERC formed a new Information Technology Directorate in 1983. The Department of Employment also increased its funding of postgraduate courses at that time, in particular awards to students taking conversion-type courses in computing and electronics. There have been other less dramatic examples of funding changes, *eg* in teacher training, which have had an influence on numbers. The availability of Career Development Loans from the Government from the mid-1980s had made it easier for people to self-fund a year's study at postgraduate level, which has also influenced take-up and participation rates.

3.7 Funding of postgraduate students

The principal public funders are: the Research Councils, notably the Science and Engineering Research Council (SERC) and the Economic and Social Research Council (ESRC); the British Academy which funds course in the arts and humanities area; and the Department of Employment through its HTNT programme. (In April 1993 the HTNT

programme was replaced, along with Employment Training and Employment Action, by a new programme, Training for Work; the latter addresses skills at all levels, not just at postgraduate.) The Research Council funding, especially the ESRC, concentrates on PhDs. This leaves many of the students on masters level courses either self funded or receiving employer sponsorship for vocational type courses. The Department for Education (DFE) provides funding for those on PGCE courses, some Local Authority Social Services Departments provide funding for Social Work courses.

As Table 3.6 shows, the Research Council funding is split almost equally between doctorate and other higher degrees (*ie* MSc/MA/MPhil). The latter represents only a small minority of total supply (13 per cent). At PhD/DPhil level it represents almost half.

Table 3.6 Comparison of research council founded higher degree students in 1990 and all higher degree students in 1989 (numbers and percentages)

	Other higher degrees	PhD and DPhils
All Research Council Funded Higher Degree Students	2,856 (45.5%)	3,415 (54.5%)
All Higher Degree Students	21,696 (73.9%)	7,645 (26.1%)
SERC funded Higher Degree Students	2,248 (45.7%)	2,666 (54.3%)
All Science and Engineering Higher Degree Students	5,664 (55.9%)	4,468 (44.1%)

Source: IMS/DES

Within science and engineering, SERC funding covers 40 per cent of students at masters level, but rather more (60 per cent) at doctorate level. In the case of the former, the HTNT programme makes a sizeable contribution. In 1991, almost 2,000 awards in engineering and technology were made through HTNT, on either MSc or combined MSc/PgD courses. The largest group of HTNT funded students, over one third, are on IT courses. Between 1991 and 1992, the overall number of awards reduced by 17 per cent, and the balance shifted towards advanced manufacturing technology and away from construction, electronics and IT, reflecting the changing employment scene.

Table 3.7 Analysis of HTNT awards, 1991 and 1992

	MSc	MSc/PgD*	PgD	Total
1991:				
Information Technology	426	393	160	979
Advanced Manufacturing Technology	109	115	16	240
New Materials	87	59	0	146
Construction	56	46	0	102
Electronics and Microelectronics	150	209	25	384
Other Technologies	300	279	182	761
Miscellaneous	10	78	159	247
Total	1138	1179	542	2859
1992:				
Information Technology	442	393	144	979
Advanced Manufacturing Technology	151	96	41	288
New Materials	83	37	0	120
Construction	47	26	0	73
Electronics and Microelectronics	117	108	37	262
Other Technologies	79	213	113	405
Miscellaneous	20	109	104	233
Total	939	982	439	2360

Source: IMS/DE

In Table 3.8 we can see the trends in the pattern of support to postgraduate training by the Research Councils in the last ten years or so. In the case of the largest, SERC, the number of studentships grew by 56 per cent between 1979/80 and 1990/91, but the balance shifted from research to taught courses (*ie* mainly masters). This partly reflects increased emphasis given to employer needs in funding policy generally, and more specifically, the increase in support to IT advanced courses in 1984. ESRC has cut back in both research and taught course studentships, and there has been little change at the other Research Councils, although latterly the number of research awards has begun to increase. Comparing these figures with the overall output figures shown earlier in this chapter, it seems likely that the Research Councils have been making a falling contribution to the overall expansion postgraduate training during the 1980s.

Table 3.8 Research council new studentships 1981-1991

Year	SERC		ESRC		AFRC/MRC/NERC	
	Research	Taught	Research	Taught	Research	Taught
1979-80	2,327	1,278	606	571	610	322
1980-81	2,274	1,302	535	535	577	303
1981-82	2,269	1,058	420	464	580	309
1982-83	2,221	959	379	387	618	317
1983-84	2,543	1,826	367	518	616	320
1984-85	2,403	1,879	381	425	625	329
1985-86	2,549	2,116	400	348	533	303
1986-87	2,597	2,188	333	293	587	280
1987-88	2,519	2,160	269	296	568	282
1988-89	2,488	2,297	284	304	584	277
1989-90	2,581(1)	2,255	246	302	702	287
1990-91	3,072(1)	2,558	274	323	783	295

(1) Research studentships include SERC overseas awards

Source: IMS/CSO

Why is this so, and what implications does it have for the labour market? To answer these questions we can turn to the growth in demand for professional postgraduate related qualifications (see paragraph 3.6) an area which largely falls outside the mainstream of Research Council funding. There have also been financial pressures on Research Council from central Government. Another factor is the increase in part-time or modular study often pursued by employees and therefore more likely to be subject to employer sponsorship (*nb* the Research Councils have traditionally favoured full-time awards). The HTNT programme may have stepped in to areas where SERC funding has been less available, either because of limits on funds or because of their awarding criteria. Students with HTNT awards are more likely to have qualifications other than First Class or Upper Second Class degrees but some relevant work experience backgrounds.

In order to explore the link between changes in funding sources and labour market experiences we need to have better data on the experiences of postgraduates in the labour market, particularly those from different funding sources. Unfortunately, as will be seen in the following chapters, it is here that data are poor and lacking in compatibility.

3.8 Summary

The last decade has seen a substantial growth in the output of postgraduate students, especially at masters and, more recently, at diploma levels, and in the former polytechnic and college sector. Growth has been concentrated in certain subjects, including IT, business/management, medical related disciplines, social studies, and in a wide range of professional areas. Engineering and, to a lesser extent, science have experienced lower than average growth rates. There has also been a growth in overseas students. Women are still in the minority, at masters and even more so at doctorate level. This compares unfavourably with the situation at undergraduate level.

The growth in postgraduate output has been fuelled by a number of factors including: the growth in first degree supply changes in professional entry requirements and professional development; growth of employer demand for graduates generally; growth in part-time study and changes in funding availability. In the case of the latter, this has been seen especially in IT and advanced technology areas, and in the growth of employer and self sponsorship. A related issue is the shift in the pattern of demand with fewer students going directly on to postgraduate studies after first degree study.

4. Postgraduate Employment Destinations

4.1 Introduction

The previous chapter has provided evidence on the increasing supply of postgraduate students. Here we focus on their initial employment destinations. This chapter is based mainly on analysis of the university First Destinations Statistics (FDS) obtained by request to the USR for a more detailed breakdown than is normally published. The FDS a record of the employment status of graduates at 31 December of the year in which they graduate. Thus, when looking at higher degree graduates, the data do not relate necessarily to the year their postgraduate studies finished (*ie* completed their thesis) nor when their award ended but the year of their graduation which may be some months or even years (in the case of some PhD students) later. The point is important to make because some higher degree graduates may have been in the labour market for some time before they are actually 'captured' by the FDS. Another important point to note is that the data excludes those who fail to qualify, a significant minority (ca. 20 per cent) in the case of PhD students.

The chapter deals mainly with university graduates because there are no comparable data on first destinations of postgraduates in the former polytechnic and college sector, as these are not collated centrally. Similarly, there is a dearth of collated information about employment destinations of diploma students.

As with the previous chapter, each of the main groups, *ie* masters, doctorates and diploma awards, are discussed separately.

4.2 Masters degrees

As shown in Chapter 3 there has been a doubling in numbers of masters graduates from universities in the last ten years. Overall, 45 per cent of university masters level graduates entered UK employment in 1991[1] (the latest year for which data are currently available), ten per cent entered further study (mainly PhDs) and almost five per cent were unemployed. The remainder, 40 per cent, were overseas students leaving the UK. If the percentages are re-calculated excluding overseasstudents, almost 75 per cent entered UK employment (see Table 4.1). Slightly more women than men 'home'

[1] Here, and throughout this chapter, percentages are based on the total with known destinations rather than the total output

students entered employment (77 compared to 73 per cent) and slightly fewer women than men went on to further study (13 compared to 17 per cent).

Table 4.1 1991 Main first destinations of university other higher degree* graduates, by gender

	Total graduates	Entering UK employment (per cent)	Overseas students leaving UK (per cent)	Entering further study (per cent)
Male	16,243	42.3 (73.1)	42.1	9.9 (17.2)
Female	9,581	49.5 (76.6)	35.4	8.7 (13.4)
Total	25,824	44.9 (74.5)	39.7	9.5 (15.7)

* Mainly masters

(*nb* figures in brackets are based on known destinations minus overseas students)

Source: IMS/USR

4.2.1 Subject breakdown

Table 4.2 shows the employment pattern by subject group of 'home' students. It highlights those subjects where there is a greater preponderance going on to PhD study, in particular physical sciences (35 per cent), humanities (29 per cent) and languages (28 per cent), and those where entry to employment is relatively high — in professional/vocational areas such as education (90 per cent), library and information work (88 per cent), business and administration (86 per cent). This is evidence of the different labour markets which exist for postgraduates in different disciplines. In particular, it shows how a masters degree is a more attractive and marketable qualification to employers in some subjects rather than others (*eg* business and administration more so than chemists), and its use as a stepping stone to PhD study (*eg* humanities and science more so than vocationally orientated disciplines such as 'architecture and related' which includes town planning). It adds weight to the argument that masters courses play an important role in professional career development, an issue we will return to later.

The overall unemployment rate for newly qualified masters graduates in 1991 stood at 4.5 per cent, which was considerably lower than the unemployment figure for first degree graduates (10.1 per cent). Interestingly, newly qualified graduates are only slightly more likely to be unemployed than all those with higher degrees in the economically active population (see Table 2.5), while new first degree graduates are more than twice as likely to be unemployed when compared with the population. The unemployment rate for new masters degree graduates, at 4.5 per cent, is also lower than the overall unemployment rate (9.6 per cent). These figures suggest, on the face of it at least, that employment demand for newly qualified

masters degree graduates is higher than for new first degree graduates. However, they do not take into consideration the higher proportion of masters students on part-time courses or returning to previous employment, nor the relevance of their qualification to the job they take up. Low unemployment does not equate to high demand *per se*.

Table 4.2 1991 University other higher degree graduates: percentage female, percentage taking further study and percentage entering UK employment, by subject group

Subject group	1991 graduates	Female (per cent)	Further study* (per cent)	UK employment* (per cent)
Medicine	1,008	41.0	11.3	81.3
Allied to Medicine	665	56.2	12.1	81.8
Biology	952	48.9	16.5	71.7
Veterinary Sciences *etc.*	593	30.0	22.1	55.8
Physical Sciences	1,141	23.9	34.8	56.8
Mathematical Sciences	1,524	26.8	19.4	70.7
Engineering and Technology	2,792	11.3	24.0	69.2
Architecture & Related	567	30.7	7.4	81.9
Social Sciences	4,660	43.5	20.7	69.9
Business & Administration	4,580	27.6	3.8	85.1
Library & Information	496	63.5	6.7	87.9
Languages & Related	1,575	58.8	28.4	50.9
Humanities	1,215	40.0	29.0	57.4
Creative Arts	275	44.0	19.8	69.5
Education	3,169	50.8	4.4	90.0
Multi-disciplinary	612	37.6	16.5	74.4
All subjects	25,824	37.1	15.7	74.5

* The percentage entering further study and UK employment have been calculated on the basis of those known to have entered an area as a percentage of total known destinations minus those overseas students leaving the UK. As the numbers of overseas students on these courses is high and the distribution variable (see Table 3.2) simply taking a percentage of those with known destinations introduces significant distortions to the results especially in subjects with small student numbers.

Source: IMS/USR

4.2.2 Unemployment

As has already been shown and will be discussed further in the next chapter, there is considerable variation in employment demand by discipline, which is shown by the different unemployment rates in Table 4.3. These range from under three per cent in education and medicine to over seven per cent in veterinary science and architecture

and related studies. In the latter, relatively high numbers enter private practice where the effect of the current recession is likely to be a factor. Also, the downturn in the construction sector has affected employment opportunities in associated professions. Engineering, which in Chapter 3 was shown to have one of the lowest growth rates, has a relatively low unemployment rate. By contrast the expanding area of business and administration studies has relatively high unemployment rates. On the whole, there appears to be no positive correlation between subject output trends and unemployment rates. Given that an increasing number of students on masters degree courses are either self or employer funded, one might have expected a stronger 'market forces effect' to be evident. In fact, there is little evidence to suggest, at least up until recently, that relatively low unemployment rates have encouraged higher student entry into certain subjects.

Table 4.3 1991 universities other higher degree total output and 'home' unemployment rate

	Total output	'Home' unemployment
Medicine	1008	2.31
Allied to Medicine	665	2.65
Biology	952	5.43
Veterinary Sciences etc.	593	7.98
Physical Sciences	1141	4.06
Mathematical Sciences	1524	6.51
Engineering and Technology	2792	3.20
Architecture & Related	567	7.38
Social Sciences	4660	4.46
Business & Administration	4580	6.91
Library & Information	496	3.57
Languages & Related	1575	4.93
Humanities	1215	5.02
Creative Arts	275	3.59
Education	3169	1.40
Multi-disciplinary	612	4.43
TOTAL	25824	4.47

Source: IMS/USR

4.2.3 Sector of employment

Moving on to look at the nature of employment in more detail, overall masters graduates entering permanent UK employment divide almost equally between the three main sectors of: industry and commerce, education, and other public services. This differs from the pattern of first degree graduates, mainly because of the importance of the education sector (mostly higher education) as an employment sector at masters level (*nb* only seven per cent of first degree graduates enter the education sector directly). Another difference is that only 12 per cent of masters graduates entered the commercial sector compared to 30 per cent of first degree graduates in 1991. The latter is accounted for largely by the high intakes of first degree graduates to accountancy training.

Table 4.4 1991 University other higher degree graduates: employment sectors as a percentage of those entering permanent employment, by subject group

Subject group	Public sector	Education	Industry	Commerce	Miscellaneous
Medicine	74.2	15.8	1.6	0.0	8.5
Allied to Medicine	75.2	13.1	6.6	0.7	4.4
Biology	51.8	18.3	16.3	6.3	7.4
Veterinary Sciences etc.	29.9	20.7	34.5	5.7	9.2
Physical Sciences	18.5	12.3	54.8	9.7	4.7
Mathematical Sciences	15.1	26.3	23.7	30.0	4.9
Engineering & Technology	9.0	13.9	67.4	6.5	3.2
Architecture	47.3	8.6	32.9	2.7	8.6
Social Sciences	51.0	19.8	3.3	10.6	15.3
Business & Administration	16.5	8.4	37.6	28.1	9.4
Library & Information	39.8	31.6	6.6	13.3	8.7
Languages & Related	10.0	56.3	2.6	15.2	15.8
Humanities	23.6	32.0	3.0	8.1	33.3
Creative Arts	9.3	32.4	4.6	7.4	46.3
Education	19.7	76.2	0.3	0.7	3.1
Multi-disciplinary	27.9	30.1	19.0	10.2	12.8
All subjects	28.5	29.2	20.8	12.1	9.4

Source: IMS/USR

The highly vocational nature of much of the masters degree output is reflected in the high sector specificity of the first destinations for many of the subjects, as shown in Table 4.4. Over half of 1991 science and engineering graduates entered industry, while approximately three quarters of those from medicine and allied subjects entered the public sector, which includes the NHS. A similar percentage of education graduates entered the education sector. By contrast, mathematical science graduates (including computer studies) were

widely spread, their training and skills being more applicable to many sectors.

Table 4.5 breaks down this analysis further into sub-sectors, focusing on those subjects where industry is a major destination. As might be expected, over half of engineering graduates entered the engineering sector, while oil, mining, chemical and allied industries took the lion's share of output from the physical sciences. Interestingly, one third of masters degree graduates in business and administration enter employment in engineering companies, with slightly fewer numbers entering the sector covering public utilities, transport and communications.

Table 4.5 1991 University other higher degree graduates: employment sub-sector entry as a percentage of those entering permanent employment, by selected subject groups

	Physical Sciences	Mathematical Sciences	Engineering & Technology	Business & Administration	All subjects
Agriculture, Forestry & Fisheries	1.4	1.5	0.0	0.7	1.8
Oil, Mining, Chemical & Allied Industries	47.6	17.5	10.0	15.8	18.7
Engineering & Allied Industries	10.5	40.9	52.2	35.3	34.5
Other Manufacturing Industries & Industrial Services	22.4	10.2	10.8	13.7	14.1
Building, Civil Engineering & Architecture	11.4	0.7	16.1	4.8	11.3
Public Utilities, Transport & Communications	6.7	29.2	11.0	29.7	19.6

Source: IMS/USR

In a similar manner, Table 4.6 analyses the pattern in the public sector. Here the extremely high specificity of masters degrees in the medical area becomes even more apparent. Social scientists and biologists also have a strong focus in local and public authorities (mainly health related ones).

4.2.4 Type of work

The vocationally specific nature of masters degrees is emphasised further by the occupational patterns and types of work new graduates enter. This is shown in Table 4.7. The majority of subject groups have clearly defined types of work: for instance over 70 per cent of 1991 medical graduates entered jobs in personnel, social, medical or security. In general, the science graduates are more occupational specific than the arts ones, the main exception being mathematics.

Table 4.6 1991 University and other higher degree graduates: public-sector entries as a percentage of those entering permanent employment, by selected subject group

	Civil Service & other Central Government Bodies	H M Forces	Local & other Public Authorities
Medicine	2.6	1.6	70.0
Allied to Medicine	1.8	0.0	73.4
Biology	16.9	0.0	34.9
Social Sciences	8.2	0.5	42.3
All subjects	5.4	0.5	22.5

Source: IMS/USR

Table 4.7 1991 University other higher degree graduates: types of work as a percentage of those entering permanent employment, by subject group

Subject group	Scientific/ Engineering R&D and Support Services	Professional services	Personnel, Social, Medical & Security Services	Teaching & Lecturing	Creative, Entertainment & Other
Medicine	15.2	3.4	71.1	10.1	0.3
Allied to Medicine	28.8	3.6	56.2	10.9	0.4
Biological Sciences	49.3	13.9	25.3	7.9	3.5
Veterinary Sciences etc.	55.2	26.4	5.7	3.4	9.2
Physical Sciences	60.3	20.9	4.2	5.0	9.7
Mathematical Sciences	18.4	62.7	1.6	12.5	4.9
Engineering & Technology	58.3	28.7	1.9	5.1	6.0
Architecture & Related	6.3	82.4	1.4	6.8	3.2
Social Sciences	2.1	34.9	42.0	16.7	4.2
Business & Administration	7.2	68.6	7.6	6.8	9.8
Library & Information	3.6	81.1	1.5	8.7	5.1
Languages & Related	0.6	28.2	5.0	52.8	13.5
Humanities	2.4	41.2	18.2	27.4	10.8
Creative Arts	3.7	13.9	1.9	38.0	42.6
Teacher Training	0.1	5.1	6.2	88.3	0.4
Multi-disciplinary	16.4	44.2	5.8	22.6	11.1
All subjects	15.4	35.8	15.8	26.9	6.1

Source: IMS/USR

4.3 Doctorates

Just under half of all newly qualified PhD/DPhil graduates enter UK employment, but if overseas graduates are excluded, this proportion increases to almost 70 per cent. A further 19 per cent continue in further study. In contrast to the pattern for masters degree output, a higher proportion of women than men continue in further study.

4.3.1 Subject breakdown

Looking across the subject groups as in Table 4.8 we see that biology and physical sciences have particularly high percentages continuing in study — mainly post-doctoral research fellowships — as do the medicine and related disciplines. Subjects with higher than average percentages entering employment include business and administration (91 per cent), library and information (100 per cent) and education (91 per cent).

Table 4.8 1991 University doctorates: percentage female, entering further study and UK employment, further study by subject group

Subject group	1991 doctorates	Female (per cent)	Further study (per cent)	UK employment (per cent)
Medicine	517	38.3	24.9	60.7
Allied to Medicine	357	44.3	27.7	58.7
Biology	1248	35.2	31.4	56.7
Veterinary Sciences etc.	232	28.4	14.7	76.1
Physical Sciences	1730	19.0	24.4	62.8
Mathematical Sciences	503	17.1	13.1	73.7
Engineering & Technology	1447	9.8	9.8	77.6
Architecture & Related	65	12.3	7.4	77.8
Social Sciences	702	25.9	11.5	76.7
Business & Administration	131	14.5	3.8	90.6
Library & Information	27	29.6	0.0	100.0
Languages & Related	429	41.3	6.7	76.4
Humanities	482	26.1	12.1	70.2
Creative Arts	47	34.0	3.6	85.7
Education	206	40.3	1.3	90.8
Multi-disciplinary	77	26.0	5.6	88.9
All subjects	8200	25.1	19.2	67.9

Source: IMS/USR

4.3.2 Unemployment

Doctoral graduates have a lower unemployment rate overall than other first or higher degree graduates, at 2.9 per cent. Different subject groups experience different levels of unemployment, and there is a different subject related pattern at doctoral level compared to masters degrees. This is most obvious for the small subjects, for example library and information doctoral graduates with zero unemployment compared with 3.6 per cent at masters degree level. Humanities and Languages PhD/DPhil graduates have higher unemployment rates overall than social science, engineering or science (see Table 4.9).

Table 4.9 1991 Universities PhD total output and 'home' unemployment rate

	Total 1991 graduate output	1991 home unemployment rate
Medicine	517	1.25
Allied to Medicine	357	2.89
Biology	1248	2.14
Veterinary Sciences etc.	232	4.59
Physical Sciences	1730	3.09
Mathematical Sciences	503	2.77
Engineering and Technology	1447	3.28
Architecture & Related	65	3.70
Social Sciences	702	1.60
Business & Administration	131	1.89
Library & Information	27	0.00
Languages & Related	429	5.29
Humanities	482	4.15
Creative Arts	47	7.14
Education	206	1.32
Multi-disciplinary	77	2.78
Total	8200	2.87

Source: IMS/USR

4.3.3 Sector of employment

The sectoral analysis, shown in Table 4.10, highlights the key distinguishing feature of the doctoral labour market — its strong focus on the education sector. Almost half of all doctorates enter permanent employment in the education sector, and unlike the pattern at masters level, the main destination within the sector is

higher education institutions. Academic employment is high for most subjects, the main exceptions being physical sciences, engineering and subjects allied to medicine. Two subject groups exhibit strong flows into industry — physical sciences and engineering, where the percentages doing so in 1991 were 49 and 47 per cent respectively. Overall, slightly higher proportions of doctorates enter industry than masters graduates. But this does not apply where it might be most expected: for instance fewer engineering and administration/business doctorates entered industry than at the masters level in 1991. If anything, there appears to be an equally anti-vocational pattern at doctoral level as there was a vocational pattern among masters graduates.

Table 4.10 1991 university doctorates: employment sectors as a percentage of those entering permanent employment, by subject group

Subject group	Public Sector	Education	Industry	Commerce	Miscellaneous
Medicine	32.1	47.7	13.0	3.1	4.1
Allied to Medicine	22.7	34.8	29.8	5.7	7.1
Biological Sciences	23.4	42.1	22.3	5.1	7.1
Veterinary Sciences etc.	19.3	45.8	24.1	3.6	7.2
Physical Sciences	10.1	33.6	48.5	5.8	2.1
Mathematical Sciences	5.7	57.1	17.9	16.5	2.8
Engineering & Technology	4.2	40.2	46.7	5.1	3.7
Architecture & Related	23.8	61.9	9.5	0.0	4.8
Social Sciences	9.2	66.4	6.3	10.5	7.6
Business & Administration	4.2	66.7	10.4	8.3	10.4
Library & Information	11.1	77.8	0.0	0.0	11.1
Languages & Related	7.6	67.7	1.9	10.1	12.7
Humanities	16.2	59.5	2.2	4.9	17.3
Creative Arts	0.0	86.4	0.0	0.0	13.6
Education	14.5	75.4	0.0	0.0	10.1
Multi-disciplinary	9.4	50.0	25.0	9.4	6.3
All subjects	13.0	46.8	27.9	6.4	5.9

Source: IMS/USR

4.3.4 Type of work

The contrast between the labour market for engineering/science doctorates and those in the arts/humanities/social sciences is emphasised in the occupational distributions shown in Table 4.11. In engineering and science the focus is mainly on R&D and support services, while in the arts, humanities and social sciences it is more likely to be teaching and professional services. Not all of those who

enter the university sector take up teaching posts: indeed in the scientific and technical disciplines a larger number go into research posts, which are not all designated as post-doctoral positions.

Table 4.11 1991 university doctorates: types of work entered by graduates as a percentage of those entering permanent employment, by subject group

Subject group	Scientific/ Engineering RD&D and Support Service	Professional Services	Personnel, Social, Medical & Security Services	Teaching & Lecturing	Creative, Entertainment & Other
Medicine	62.7	5.2	15.5	12.4	4.1
Allied to Medicine	58.2	9.2	20.6	9.9	2.1
Biological Sciences	68.2	14.3	5.3	9.4	2.9
Veterinary Sciences etc.	62.7	12.0	14.5	8.4	2.4
Physical Sciences	76.3	14.2	1.6	5.5	2.3
Mathematical Sciences	45.3	27.4	0.0	24.1	3.3
Engineering & Technology	68.0	17.2	0.4	11.3	3.2
Architecture & Related	4.8	52.4	0.0	42.9	0.0
Social Sciences	6.7	34.9	5.0	48.7	4.6
Business & Administration	6.3	31.3	6.3	54.2	2.1
Library & Information	0.0	44.4	0.0	55.6	0.0
Languages & Related	1.3	29.1	3.2	55.7	10.8
Humanities	2.7	35.1	10.8	45.4	5.9
Creative Arts	0.0	9.1	0.0	81.8	9.1
Education	0.0	7.2	5.8	87.0	0.0
Multi-disciplinary	50.0	21.9	6.3	18.8	3.1
All subjects	52.0	18.8	4.9	20.7	3.5

Source: IMS/USR

4.4 Postgraduate diplomas

Unfortunately, there are very little data on destinations of postgraduate diploma holders. The exception is the PGCE students where 75 per cent who qualify go into teaching posts in the same year. A small percentage (three per cent) are recorded unemployed and the remainder take up other work. A small amount of data exists from some colleges: for example in a survey of 92 PgD graduates from colleges of higher education in 1991, 76 per cent entered employment, mainly in the public sector, and 13 per cent were unemployed. However, this sample represents only 0.5 per cent of total PgD output, and so is unlikely to be representative.

There are real difficulties therefore caused by this lack of data in drawing any valid conclusions about the PgD labour market. This is a major issue as this area has experienced very rapid growth over the last decade or so. Some PgDs are very much linked to individual professions, such as teaching, nursing, law, social work, and library and information studies, but others have a wider employment focus and overlap with the first degree and masters degree markets.

4.5 Summary

The only comprehensive source of data on employment destinations of newly qualified postgraduates is the USR, covering the university sector. The focus here is masters and doctoral output. Very little exists on PgD output in general and higher degree output in the former polytechnic and college sector. Overall, unemployment rates of university postgraduates are low in comparison to first degree graduates and the general population. At masters level there is a strong vocational pattern and considerable sector specificity in relation to subject. At doctoral level, the main destination is the university sector. However, it is clear that the doctoral and masters labour markets overlap to some extent, and both also overlap with the first degree graduate market.

5. Recent Employer Recruitment Patterns

5.1 Introduction

The previous chapter has presented data on the employment destinations of postgraduates and highlighted the wide range of employment initially taken up, especially non-PhD graduates. In this chapter we focus on employers' perspectives. It is concerned principally with non-academic employment in the public and private sectors, and draws mainly from the literature on previous research and our employer interviews. Apart from the FDS, there is very little reliable data available about employer recruitment patterns and demand trends at postgraduate level.

The key questions it addresses are:

- What have been the recent trends in postgraduate intakes?
- To what extent do employers seek to recruit postgraduates?
- What evidence is there of shortages — and what are the responses to them?
- What involvement, other than recruitment, do employers have in postgraduate education and training?

5.2 Postgraduate recruitment policies

Over the last ten years, there has been a shift in broad employment patterns of graduates in general, due to the growth in demand for graduates by the public sector and by commerce at the expense of industry. This has been seen also in postgraduate employment, though the education sector has a more significant role here than at first degree level.

Although the FDS provide an indication of trends in initial employment, they are limited in terms of their reliability (see Chapter 5) and do not indicate the extent to which there is a discrete demand for graduates with higher degrees or diplomas. How relevant are postgraduate studies to employers in different sectors? And to what extent, if any, are employers seeking postgraduate qualifications for certain jobs?

There is little doubt that a market for postgraduates exists: vacancies for postgraduates are advertised in the graduate press (*eg* CSU Current Vacancies) and careers information material is written specifically for postgraduate students. However, much of this is

geared towards science, and particularly science PhDs. Outside the academic sector where at least a masters qualification is usually sought (Pearson *et al.*, 1991), it is rare to see an advertisement specifying a higher degree in the social sciences or humanities, other than possibly an MBA or in a specialist discipline such as occupational psychology, information studies, or transport planning. The physical sciences is really the only area where a postgraduate qualification gets a specific mention for research posts *eg* organic chemists, microbiologists, biotechnologists. This was confirmed in our small sample of interviews, where the vast majority of employers did not specifically seek to recruit postgraduates. The exceptions were the companies with high R&D investments (mainly chemicals, oil and public laboratories) where recruitment at postgraduate level was focused on doctorate rather than masters' qualifications. Some commented that a small number of vacancies arose from time to time for PhDs with very specific research experience, but in general if any newly qualified postgraduates were to be recruited they entered as part of general graduate intakes. Areas outside of higher education where postgraduate qualifications in social sciences were deemed to be advantageous included economics in the financial sector, statisticians in the Civil Service, and in many international appointments.

According to the FDS, about one in three of university higher degree (*ie* mainly masters) graduates either stayed with during, or returned to their employer after, receiving their qualification. This suggests that some at least had taken their higher degree for a job-related reason. It also includes those taking part-time courses — an increasing mode of study (but where data on output is poor). This was also borne out by the interviews where several employers mentioned their sponsorship or development programmes for individuals, *eg*: an IT company sponsoring 30 to 40 employees each year on MBA or MSc programmes as part of their individual development; an engineering company which sponsors individuals on company-designed Msc courses or consortia MBAs and, less often, researchers on PhD studies in a specific problem area; an engineering company participating in the Teaching Company Programme with 10-12 Teaching Company Associates at different stages of their PhDs. (*Nb* there are several hundred PhD students who are Teaching Company Associates scattered across a similar number of companies.)

The only recent source of general evidence on employer recruitment policies is the survey commissioned for the inter-departmental review of demand for graduates in 1989 (HMSO, 1990). This showed that 40 per cent of employers had recruited higher degree graduates in 1988, and 40 per cent of them (or 16 per cent of the total) had explicitly sought them. The remainder, *ie* 60 per cent, of recruiters of higher degree graduates, recruited them as part of their general (*ie* first degree) intake rather than to fill for specific posts. These figures are based on a sub-sample of only 100 of the survey population and are not broken down by size. There is no evidence to suggest that the large recruiters are more likely to be 'higher degree specific' recruiters and therefore make up the majority share of this part of the postgraduate market. In actual fact there is very little evidence about the behaviour in general of very small graduate recruiters and what share of the market they represent. The views of careers advisers and

academics is that they *are* important players in the postgraduate labour market (especially at PhD level and in certain disciplines *eg* mathematics), with as many as half of the total intake of postgraduates to the private sector joining small firms but there are no data available as yet to support this view.

Other recruitment evidence comes from the annual AGR surveys of recruiters. This covers their membership which currently stands at around 400 and includes the vast majority of active graduate recruiters (mainly the large ones). A quarter of industrial and ten per cent of non-industrial companies paid a premium for PhD graduates in 1992, and slightly higher proportions did so for MSc/MA graduates. Overall, these proportions are slightly down on the equivalent figures two years previously, but they are not based on exactly the same samples. It is difficult to conclude whether this difference reflects a real shift in employer recognition of higher degree qualifications or the changes in the graduate market between 1990 and 1992. The survey did not ask about postgraduates recruited and not paid a premium, nor is it clear whether the salary differential simply reflected differences in ages. In some cases, the higher starting salary is the equivalent of only one increment for MScs and three for PhDs reflecting the extra years of study.

Several careers guidance information sources (*eg* CRAC Student Guide to Postgraduate Studies) refer to the advantage of a postgraduate qualification to any young (or old) engineer wanting to work in a variety of technological fields (*eg* space technology, biomedical electronics, traffic engineering, energy conservation). They also refer to the need for many engineers to take an extra year's study to prepare themselves for a career in engineering research and development, and the European factor — in most European countries a graduate has usually done more than a basic three year course at a university. There is little direct evidence however to support this and none from our interviews: outside the academic sector, the number of new postgraduate engineers being recruited to the above fields of work is currently very small, and moreover, if the jobs of engineers after postgraduate study are compared with those of first degree graduates there appear to be no significant differences between them. Around 60 per cent of first degree graduates in engineering entering UK employment took up research, design or development work. A difficulty encountered by one of our interviewees in the aerospace sector was that often postgraduate study was not relevant enough to meet their needs so the company preferred to take first degree graduates and give them relevant experience on a two year entry scheme. In fact, this company had actually discontinued their masters intake a few years ago because of the difficulty in finding postgraduates with relevant experience.

According to a SERC enquiry on 'The Engineering Doctorate' in 1990 most engineering companies which design and manufacture equipment and systems were critical of the current engineering PhD. Many were reported as having no specific policy to recruit PhDs, while others actively avoided them, preferring MEng or BSc graduates instead. One of our interviewees also pointed to the MEng model as one which met their needs. It was preferred to a 'first degree + masters' both because of the greater integration in the

overall study period and the greater likelihood that the MEng student had gained some relevant experience of the world of work.

Information Technology is another area where little value in general is put on postgraduate qualifications, especially PhDs. Pearson and Connor, in their 1985 government sponsored study of IT manpower trends, found only 13 per cent of IT employers had specifically sought postgraduate level skills. This compares with almost 40 per cent which had recruited graduates of any kind. Numbers of IT postgraduate recruits were generally small compared to overall graduate numbers: *eg* 22 higher degree graduates out of 400 graduate recruits in total in one company, and 34 out of 500 in another very large IT company. Some IT employers at that time had recruited graduates from the one year 'conversion' courses. As mentioned in Chapter 3 this was a major government programme to boost the output of IT graduates, which was mainly funded through the SERC but also attracted funding from a wide range of sources including the Employment Department. During the 1980s most students from these courses (at masters and diploma levels) had very little difficulty in finding suitable employment on graduation, but they were generally recruited alongside first degree students with relevant IT degrees.

In a recent follow-up study (Connor, 1991) it was evident that conversion course graduates were continuing to supplement the general intake of first degree graduates. Although there are mixed reports about how they are faring on the current job market, employers at that time found conversion course students attractive for several reasons, including: they had demonstrated a commitment to IT by taking the course; had more mature attitudes to work and often relevant work experience; and better personal skills than most first degree graduates. Over half of the 50 employers in this follow-up survey stated however that their preferred source of graduates was first degree graduates in a relevant IT discipline, but for 32 per cent it was postgraduates in IT. Particular emphasis was put on the development of hybrid jobs in some organisations and the need to recruit graduates with a broad range of interests and more than one specialist skill area (*eg* IT and business applications; IT and management skills; IT and financial management). A small number of mainly science-based organisations found graduates with a science first degree and a non-science postgraduate qualification especially attractive. Two of our interviewees from science-based companies made similar comments.

Engineers and IT specialists are not generally under the same pressures as physicists, geologists or chemists to take a higher degree if they want an industrial R&D career. For the latter, a PhD has been seen as virtually a necessity for professional recognition. On the whole, scientists are more likely to use their higher degree than their first degree in their first job. Biotechnology, a small but growing sector, also has a greater requirement for postgraduate studies, especially at the PhD level: in a 1988 IMS survey a third of new recruits to this sector were new graduates, 17 per cent PhDs and seven per cent MScs (Waite, Pearson and Pike, 1988).

By contrast, few employers have a specific requirement for postgraduate social scientists. In a recent IMS survey (Pearson *et al.*,

1991) PhDs were rarely recognised as a separate category and few employers outside the academic sector had a specific requirement for masters or doctorate level postgraduates in the social sciences. The main exceptions were a small number of large independent research institutes and consultancy organisations, and the public sector.

Despite these various studies which tend to emphasise the relatively low value placed by recruiters on postgraduate qualifications in certain subject areas, the more general qualities of higher degree graduates are often valued by individual line managers. Intellectual ability, maturity, breadth of experience and initiative and independence were mentioned by (Hirsh, 1982) in her research on postgraduate training of researchers, and would seem to have still more significance today in the light of the technological and organisational change employees are expected to cope with. She argues against tailoring postgraduate courses too finely to expressed needs of employers at any greatly disaggregated level; the skills sought are too general and substitution (or the potential for it) so widespread to make it a sensible strategy. Some of the employers of science PhDs cautioned against producing too many specialists emphasising the need for good 'life scientists' and those with an understanding of the wider scientific context for their own specialism.

Apart from the research done on the IT conversion courses mentioned above (which included MScs and diplomas), no specific evidence was found in the literature review about postgraduate diploma courses and employers' behaviour towards them. In the sample of employer interviews, none made any separate distinction between them and graduate entrants as a whole. The majority were not sure if they had actually recruited any at all.

5.3 Recruitment trends

Chapter 4 has presented data on postgraduate employment trends which show the main sectoral patterns. Apart from the FDS data, there is little evidence of any reliability about trends in demand from industry for postgraduate recruits. Most of the companies we interviewed had reduced intakes for postgraduates in line with those for first degree graduates in the last year or two. There was no evidence of any deliberate policy to use postgraduate studies in selection criteria to deal more effectively with the current flood of applications, but it may be too early (and based on too small a sample) to discern any real change here. In practice, as one careers adviser put it: '...industry recruits the best it can attract when it needs to, and raises the minimum qualification levels if it can...'. Boom and recession result in fluctuations in intakes, and this will be reflected in the balance between higher and first degree graduate recruits.

5.4 Academic employment

Chapter 4 has shown that a major destination of higher degree graduates, especially PhDs, is the higher education sector. Overall, the population of academic staff (*ie* teacher researchers) has decreased by about ten per cent between 1981 and 1989, but by much less in both engineering and sciences (under six per cent). By contrast, post doctoral researchers have increased substantially, by over 70 per cent overall, and even more so in engineering (see Table 5.1). The main entry route here is through postgraduate study. An increasing proportion of them are being funded by foundations and industry, rather than by Research Councils and other public funding sources: in 1980 over 75 per cent were supported by public funds, but by 1989 this had been reduced to 55 per cent. Similarly, Research Assistants (mostly masters rather than first degree graduates, and often registered for PhDs) have also grown substantially. The balance of funding of Research Assistants in engineering and science has also shifted away from the SERC and towards industry and foundations (*Atkinson, 1991*).

Table 5.1 Research staff in universities

	1980	1989	% change
Post Doctoral Researchers	2897	5025	+73.4
Science	1112	1889	+69.8
Engineering	603	1129	+87.2
Research Assistants	4393	7741	+76.2
Science	2081	3776	+81.5
Engineering	887	1443	+62.6
Academic Staff (full-time)	33989	30384	-10.6
Science	9314	9049	-2.9
Engineering	4713	4441	-5.8

Source: Atkinson (1992)

This is further evidence of the increasing links being established between industry and higher education, and in particular the contribution of industry to research funding in HE, and hence research employment. It also suggests a change in career profiles of academic staff, with many more having to take a series of temporary or contract posts after completing postgraduate studies. An IMS survey of academic staff (Pearson *et al.*, 1990) showed that the expansion of the academic workforce in the period 1985-89 was almost entirely due to the growth of externally funded staff (*ie* from specific project income rather than university income). They are mostly drawn from the output of postgraduate students and existing contract research staff. Many move from one short term contract to

another, or to work in private industry when contracts finish (Varlaam, 1987).

5.5 Shortages

Until the last year or two, the particular problems that faced employers of postgraduates in science and technology largely mirrored those in the broader labour market. For example, HEIs experienced difficulties recruiting staff to IT departments during much of the mid-late 1980s (Connor and Pearson, 1987), and problems of retention were evident. The additional vacancies created by the 'new blood' and other initiatives led to recruitment problems in IT and engineering. There were also selective shortages in industry, in areas of biotechnology, electronics engineering, chemical engineering and IT. The Save British Science Society presented evidence to the Secretary of State for Education and Science in 1989, detailing problems filling postgraduate and postdoctoral positions. Many departments, especially engineering, had difficulties in filling quota studentship awards and some also reported falling quality standards of PhDs. This was seen to be a direct result of competition in the labour market.

Partly as result of the economic recession and also because of improvements to the supply of postgraduates, many of these concerns over shortages have disappeared. Few employers are experiencing any difficulties at all, in numerical terms. However, there are still some very specific skill shortages — typically finding 'a few of the very best', *eg* PhD synthetic organic chemists and molecular or cellular biologists. Employers seeking such people go to great lengths to recruit them, including keeping up close contacts with academic departments and recruiting 'talent-spotters' to keep track of former students during post-doctoral studies (even those who have gone abroad).

5.6 Summary

There is no comprehensive data source about employers' requirements for postgraduates. Much of the available evidence comes from *ad hoc* discipline or sector specific studies and general graduate studies. These show, and confirmed by our interviews, that few employers seek to recruit postgraduates. In the engineering, science and social science, postgraduates are recruited to a wide range of employers and jobs; and their demand overlaps considerably with that for first degree graduates. Recruitment shortages are not a major problem at present. There is a different pattern among some of the smaller 'professionally orientated' disciplines where a postgraduate qualification is becoming the norm for entry. There is also a changing pattern within higher education with an increase in short-term contract research positions and being filled by postgraduates.

6. Entry Into Employment — The Individual Perspective

6.1 Introduction

The previous two chapters have provided an assessment of the main trends in the recruitment of postgraduates. Here we look more closely at their flow into employment, in particular the initial experiences of new postgraduates in the labour market.

6.2 Job search

Most postgraduate students, like their undergraduate counterparts, commence some kind of job-seeking activity before completing their studies. In a recent IMS survey of PhD social scientists, 75 per cent had started seeking employment before their research was complete (Pearson *et al.*, 1991). In a similar follow-up survey of science PhD students, undertaken a few years earlier in 1986 (Connor and Varlaam, 1987), 64 per cent had started job search activities before the end of the July of their final year, but this varied by subject group: chemists and mathematicians tended to start their job search earlier, and were more successful in finding suitable employment, than biologists and physicists. There is no other evidence available to link the timing of job search with success in finding suitable work. However, in the current depressed graduate market, more postgraduates are giving attention to securing a job in the year before they are due to finish, as witnessed by employers who are seeing more of them on their milkround visits and open days.

Students' perceptions of when their postgraduate studies actually finish vary considerably, especially those undertaking doctoral studies. Most PhD students complete the final writing up of their thesis some months, or even years, after the end of their awards when they have been in employment for some time. Some masters course students also spend some time writing up their project after the official end date of the course. Thus, entry into the labour market does not necessarily coincide with the date their award finishes or their graduation date, but usually somewhere in between. This point is particularly important in connection with the FDS, mentioned in earlier sections. It means it is difficult to arrive at a meaningful unemployment figure for postgraduates in any one year.

Increasingly, postgraduate students are being forced to combine serious job seeking activity (or for the more fortunate, the start of their first job) with the completion of their thesis which can bring extra pressures. Although the graduate careers advisory services deal

mainly with first degree students, they are increasingly advising and providing job information to postgraduates, mainly from masters and PgD courses. This is partly a consequence of simply their visibility in increased numbers but also because of the current difficult graduate recruitment market. PhD students are more likely to obtain their first appointment through employer contact with their department or research tutor, or through informal academic networks, but they too are becoming more visible on employer milkrounds, open days and graduate recruitment fairs. There is, as yet, no separate postgraduate recruitment activity organised via the careers services, though some institutions (*eg* Cambridge) have run special postgraduate events for employers.

The role of HEI departments in actively assisting their students in seeking jobs is generally more significant at higher than first degree level. Some departments are obviously more career orientated than others and have stronger links with employers. In a 1981 survey of academic departments (Whalley, PSI, 1982) around 40 per cent advised or helped students by arranging meetings or introductions, inviting employers to visit or seeking employment opportunities within their own circle of employer contacts. Careers advice was more commonly available within engineering and science than in social sciences. This percentage is likely to be much higher now, given the increase generally in academic-industrial link activity during the 1980s. SERC has introduced a successful programme of Graduate Schools to help PhDs make better career decisions. This involves a number of large recruiters of PhD scientists and engineers. However, there is still a lot of informal advice given to postgraduates, given with the best intentions in mind, but in some cases by academics with little or no experience of work elsewhere.

6.3 Finding suitable employment

Despite the relatively low unemployment figures for postgraduates in the FDS, there is evidence that a significant minority experience difficulties in finding suitable employment. For example, in the follow-up study of science PhDs mentioned above, (Connor and Varlaam, 1987) 38 per cent overall found it difficult to find a job they wanted, but this varied from 19 per cent of physicists to 43 per cent of biologists. One in four reported a shortage of vacancies. Other reasons for difficulty included 'research not relevant', 'lack of careers advice' and 'employer wanted more experience', but numbers reporting each of these were quite small.

The number of available vacancies was seen as the major constraint by social science doctorates in finding suitable employment in the 1991 IMS follow-up study: almost half of the total sample found this was a very significant factor and 20 per cent were restricted by job location. The latter is linked to individual mobility: postgraduates tend to be older than first degree graduates on average, often in their late 20s or early 30s with the likelihood of more established family ties. Mature graduates in the IMS survey of social science doctorates faced more difficulty on average than others: 26 per cent of mature

graduates compared to 16 per cent of younger ones found it very difficult to secure the employment they wanted. There was a wide acknowledgment that many employers were unable or unwilling to employ older graduates. These difficulties faced by older graduates are of course acknowledged at first degree level. In an AGCAS Report (Graham, 1990) employers were urged to abolish age restrictions and make recruitment literature more 'mature' friendly. However, there is little evidence, outside of the public sector, that organisations have made significant changes here.

Postgraduates from more vocationally orientated disciplines *eg* business studies, economics, IT, have, in the past, generally experienced the least difficulty in job search. This was evident in the social scientists study mentioned above, as well as in follow-up studies of postgraduates from IT masters courses which IMS conducted for SERC during the mid-1980s (see for example Pearson and Connor, 1986).

6.4 Relevance of their study to their first job

There are substantial differences in the first jobs taken up by postgraduates. As shown in Chapter 4, a major employing sector is higher education. Here, at least initially, their employment is likely to be closely related to the subject of their postgraduate studies. The picture in private industry is generally quite different with postgraduates entering a wide range of jobs, often unrelated to their degree study. While most postgraduates consider their higher degree studies to be useful in their first job, only a small minority consider it a requirement. This has been demonstrated in several studies, for example:

- a PSI study which traced 1977 postgraduates through to 1982, and found only ten per cent of masters and 21 per cent of doctorates saying they needed their higher degree to obtain their job; furthermore 45 per cent felt it was likely that they would have got their job without it (Brown, 1982);
- the 1986 follow-up study of science PhDs (Connor and Varlaam, SERC) which showed that while 58 per cent felt their PhD study was essential in getting their first job, only 37 per cent found it essential for doing it (*nb* over half of this sample was in academic employment); and
- the more recent social science PhD study (Pearson *et al.*, 1991) where only 34 per cent of those in employment outside the academic sector said their first job was very related to their academic study.

These, and other studies generally agree on the relevance of skills learned in postgraduate study, such as computing and statistical analysis, research methods, and specific scientific laboratory skills.

6.5 Early careers

There is very little evidence about the early career progress of postgraduates. What does exist comes from the *ad hoc* surveys already mentioned above. The main finding from them is that there is a net flow from academia into industry and commerce after two or three years, often after doing post-doctoral research. For example, 12 per cent fewer PhD scientists in 1986 were working in the academic sector in their second job than in their first job (Connor and Varlaam, 1987).

It is extremely difficult to obtain useful information from employers about career progress of different groups of postgraduate entrants, often because the numbers of higher degree graduates per company are very small, making it difficult to discern a trend.

6.6 Salary progression and rates of return

One way of looking at the role of postgraduate training in career progression is to look at pay some years after graduation. However, what determines pay is a complex interaction of many factors and there is little up-to-date evidence on the extent to which postgraduate study can be separately identified as a key determining factor. Research here has been concentrated on the early 1980s and earlier (see for example Dolton and Makepeace, 1992), making use of the large data set available from the 1980 Graduate Cohort Survey. This has shown the large dispersion of earnings by subject area (not surprising, given what has been said earlier about the range of work postgraduates undertake) and also between initial earnings and those six years later. There is some evidence that masters degrees can be beneficial to men (but not women) in raising earnings slightly but a PhD has no significant effect. A PGCE, on the other hand, was detrimental to men's earnings (but neutral to women's).

This research evidence raises the question of the financial return of postgraduate study in the six year period following a first degree. Good performance at first degree level tends to be rewarded by higher earnings (see AGR surveys showing premiums paid to first class honours graduates) but the benefits of doing postgraduate study are less obvious. Since many 1st and 2.1 graduates continue in postgraduate studies, it is likely that time spent in employment would have been at least as, if not more, remunerative. In particular, the short-term financial pay-offs from PhD study would appear to be limited. This point was confirmed by one of our interviewers, a major recruiter of PhD chemists and biologists, who took the view that a very able first degree graduate could be on the same salary level (and similar job, *ie* a senior researcher) as a PhD entrant (of the same age) after 4-5 years. Another interviewee put emphasis on the importance of *relevance* of postgraduate training in determining pay levels.

Some of this evidence from the research literature may be pessimistic. It excludes output from many of the new taught masters courses, in particular MBAs, whose value to employers is often greater than some of the more traditional postgraduate output. It also refers

mainly to a period when postgraduate output was very much smaller than at present. It may be that the expansion in output has produced a different pattern in terms of early career and salary profiles, especially the growth in profession-related postgraduate training. There is a need also to take account of the recently introduced student loans.

6.7 Summary

Job search behaviour and techniques of postgraduates are beginning to change under the twin pressures of the depressed recruitment market and its broader and more fragmented nature. More postgraduates are making use of the HE careers advisory service, and participating in on-campus graduate recruitment activities which are primarily aimed at first degree graduates. While improvements have been made to providing careers guidance to postgraduates, a larger number still rely on assistance from their academic department and elsewhere.

Although unemployment levels are relatively low in general, a significant minority of postgraduates experience difficulty in finding suitable and relevant employment. There is a suggestion that they may be being more selective than first degree graduates. There is little conclusive evidence of the financial benefits of postgraduate study. This ties in with evidence presented earlier of the overlap between the first and higher degree labour market, and the lack of specific employer demand for postgraduates in many areas.

7. Future Trends

7.1 Introduction

We have seen in earlier sections that the employment opportunities for postgraduate students are linked to those of graduates generally. Furthermore, there is a high degree of substitution not only between disciplines and between masters and first degree graduates, but also between doctorates and other graduates. Both personal skills and the relevance of postgraduate training and work experience play increasingly important roles in the recruitment and selection process.

Future trends in the labour market for postgraduates will largely mirror those in the graduate market as a whole. The supply will depend on:

- levels of funding and priorities of Government and agencies, *eg* the Research Councils, ABRC, UFCs;
- the nature and level of demand from new first degree graduates and others (*eg* employees);
- the extent to which employers become more involved in supporting postgraduate training; and
- priorities given to different disciplines and courses at first degree, PgD and higher degree levels by individual institutions.

Recruitment of postgraduates over the next decade will be affected by:

- the demand for highly qualified manpower generally in the economy;
- the availability and cost of alternative sources of labour, be they first degree graduates or older experienced people;
- international migration, particularly the influence of European mobility and demand for particular specialists in the US;
- the growth of new areas of employment that may become key foci for postgraduate employment;
- the growth of the HE sector and the need to replace academic staff who are leaving or retiring;
- R&D investment decisions, and the impact of other factors internal to companies such as organisational and technological developments.

Unfortunately, patterns of change in all these factors, in particular those affecting demand, are uncertain, and appear to be even more so

in the current economic climate. No projections of future trends in the postgraduate labour market are available. Instead we have to consider broad directions of change and the assumptions underlying them. This is the subject of this chapter.

7.2 Supply projections

There is a widespread expectation that postgraduate output will continue to expand, though probably not at quite the rate of first degree students. Government expenditure constraints are likely to have an effect of reining in the levels of funding of postgraduate studentships in the next year or two, while the massive influx of new first degree students currently in the system is unlikely to be translated into a similar increase at postgraduate level. Research Councils' training budgets are likely to require much better evidence about manpower needs, especially of employers in private industry, which will be another constraining factor. It is likely that the balance of support will shift to masters level training in science and technology and the introduction of new patterns of postgraduate training.

There is likely to be a continuing high demand for postgraduate training places partly as an alternative to unemployment but also because students are looking at ways of differentiating themselves in a larger pool.

More organisations are becoming interested in providing postgraduate training, mainly MBA and MSc, to their employees as part of their professional and career development. There is also the continuation of the move to 'graduatisation' of professions — more individuals without first degree qualifications but relevant work experience, will be seeking some formal training, often at an equivalent level to postgraduate training. There will also be a continuation of current trends for first degree graduates to take a postgraduate qualification as part of entry to professions.

Any overall growth in output, however, is more likely to be accompanied by a growth in employer and self funding, than in the greater use of public funds.

It is likely that we will see a change in the pattern of postgraduate training which in many respects will be a continuation of current trends: more part-time courses and part-time PhD research studies; student (and employer) interest in more vocational higher degrees; an increase in 'hybrids' *eg* chemistry first degree and IT higher degree; an increased emphasis on research skills and techniques rather than simply the acquisition of specialist knowledge; more inter-disciplinary studies; more collaboration between industry and institutions; and more international study, especially within Europe. There will also be a growth of research students in parts of the new university sector, and possibly an even more uneven distribution of postgraduates between institutions, as distinct categories of universities emerge.

7.3 Recruitment prospects

The lack of specific policies by employers for targeting postgraduates means that little evidence is available about likely future changes in demand. The widespread assumption is that trends will be similar to those for first degree graduates: *ie* a further overall reduction in vacancies this year, with some suggestions of expansion in 1994 or 1995 (see AGR, 1992). The timing of the pick-up in the graduate recruitment market depends on when the economy starts to show a sustained recovery. Although postgraduates represent a growing sub-group of the graduate population, there is no evidence that, in general, they are likely to find jobs more easily than first degree graduates. Factors such as their personal characteristics, the relevance of their postgraduate studies, their technical work and their prior work experience, are likely to be as important as subject qualification. The suggestion that employers may start to use postgraduate qualifications as part of their general selection process, almost as a first filter in shortlisting for mainstream graduate intakes, does not have any supporting evidence, as yet.

For the 'super-specialists', *ie* PhD students in particular disciplines, such as synthetic organic chemists, where a small discrete labour market can be discerned, future demand is likely to be at a similar level to today. This assumes that the economic recovery will take place and employers continue broadly with current levels of R&D activity. None of our interviewees expected numbers to increase significantly, but as we are talking here about a very small and scattered population, an overall picture of future trends is hard to get. Many of the UK's large R&D science and engineering establishments are divisions of international companies, where there is an increased emphasis on integrating research programmes across international boundaries, and making use of an international pool of labour. Decisions on research investment affecting manpower are often taken on a global basis. Also, their ability to attract and retain highly qualified people can be affected by supply and demand trends in other countries, especially the US.

In much of higher education and public funded research, especially post-doctoral posts and in the public sector laboratories, future employment levels will depend to some extent on the funding allocated by government to the Research Councils and decisions by them on how to distribute funds between training, employment and capital costs. The recent recommendations of the White Paper on science and technology are likely to have an influence on employment levels in the science base. The current trend towards more short-term funding of projects and temporary research assistant posts is likely to continue. Each Research Council has up to now made its own decisions about changes in the balance of funds between programmes and subject committees, so it is impossible to make any detailed forecasts of recruitment needs. The 'peace dividend' is likely to have an effect on reducing postgraduate employment in defence related R&D establishments.

Employment in higher education teaching and research will also depend on the extent to which projected growth in student numbers

will actually materialise, and the likely increases in staff:student ratios and wastage rates, in particular retirements. The latter is a factor of particular significance to the social science and parts of the science academic community, who have an increasingly old age profile. Various models of academic staffing have been undertaken by IMS, SERC and others on different disciplines. While the forecasts vary considerably depending on the assumptions built into the model, the general picture is one of growing employment levels. Future recruitment needs are likely to be static or expand slightly, throughout the 1990s, but there is likely to be variation by subject group.

7.4 Summary

There are no detailed projections available on future trends in the postgraduate labour market. While supply is likely to increase, the pattern of output will change, comprising more part-time or modular study, more attention to training or research techniques and more cross-disciplinary studies. Trends in employer requirements are likely to mirror those in the first degree market, with demand remaining fairly static, at best, until 1994 or 1995. There is an increasing international dimension to the science and technology market at higher levels. Future employment in the higher education sector is likely to be affected by student growth trends, and institutional reorganisation and funding changes.

8. Overview and Conclusions

8.1 Introduction

The purpose of this paper has been to review the evidence on the nature and workings of the postgraduate labour market. In this final section we summarise the main findings and examine some implications of them for the future.

8.2 Postgraduate education and training

The last decade has seen a substantial growth in postgraduate study. Higher degree graduates in the workforce, though still a small minority, are about twice as numerous now as they were ten years ago. Much of this expansion has focused on masters degrees, and, latterly, on postgraduate diplomas (PgDs) too, and in the more vocational subjects.

No less important, has been the change in the perceived purpose of postgraduate study, as seen in its changed content and balance. Increasingly, it represents a significant part of professional training or simply an extension of first degree studies, with no particular career aim, rather than being used as a first step to a research career. Debate continues about the value of a PhD training, whether it should be viewed as a period of academic research training or modified more closely to meet the needs of industry and commerce. More attention is being paid to manpower issues in the allocation of public funds for postgraduate studentships. A series of new initiatives have been developed to make postgraduate study more relevant to industry, notably CASE awards, Link Schemes, the Teaching Company Scheme and the HTNT programme.

It is noticeable too that there has been a reducing role for public funds in postgraduate study as a whole (though not at the PgD level where the HTNT programme has made a major contribution in engineering and technology). Much of the increase in overall supply has been less to do with specific government policy than a combination of other factors, *eg*: the 'graduatisation' of many professions; shift in student interest towards postgraduate study especially in the social sciences; skill shortages in the labour market; employers' increased interest in supporting and collaborating with HE; and the general desire by individuals to improve their qualification levels. There have been moves, coming mainly from within the academic community, to change the teaching and content of postgraduate studies to make it more efficient (ESRC, 1990). These,

as well as the government's general policies towards higher education, have been the main influences on the shape of postgraduate study rather than any government postgraduate policy *per se*. This is similar to what has been happening in most other developed countries (OECD, 1987). However, this may begin to change because of the changing employment market for graduates and the increasing demand for places on postgraduate study, either directly after a first degree or some years later when in employment. The removal of the binary line and other changes within the higher education system, such as greater integration of different levels and disciplines, reductions in length of first degree courses and student loans, the Enterprise in Higher Education (EHE) initiative to improve the relevance of HE courses to the development of students' core skills and the world of work, and the expanding requirements for continuing development and professional updating from people in work, will also be key influences.

8.3 The expanding supply

Despite a downturn in the 18 year old population which began in the late 1980s, higher education has been booming in terms of student numbers. Postgraduate output grew by around 40 per cent overall between 1981 and 1989, though exact statistics on trends are difficult to obtain because of the need to use a number of incompatible data sources (*nb* the 40 per cent figure includes overseas students). In the university sector, the main growth in home students since 1984 has been at 'other higher degree' level (*ie* mainly masters), up by 60 per cent over the decade. Regarding the old polytechnics and colleges sector there are much less data on postgraduate output. The majority of awards are at PgD level, including teacher training and other professional qualifications, where there has been moderate (though fluctuating) growth since 1984. Currently, intakes to teacher training are increasing, after a period of recent decline.

Major subject growth areas have been IT, business/management studies, medical related subjects (*eg* nursing) and social studies. These reflect a range of different influences. For some, trends within the profession/vocational areas have been a major reason for growth, while for others it has been higher than average student interest at undergraduate level. Part-time study has also flourished, though the paucity and poor access to data here meant that it was not covered in any detail in the review.

The recent expansion at first degree level has yet to feed into the postgraduate output but expectations are that the numbers of postgraduate students will continue to expand during the rest of the decade at least. The sudden downturn in the graduate recruitment market has led to a rush in demand for postgraduate study and the quality of intakes, especially in some disciplines (*eg* engineering), has improved.

There is increased interest among employers and employees for postgraduate study as part of advanced continuing education (CET)

and professional development. In a 1989 study on corporate support to HE (CIHE,1989), three quarters of the top 200 UK companies surveyed expected to increase their purchase of advanced CET and for one in five it was a relatively new practice. Although these findings may seem a little over-optimistic in the current economic climate, they do bear out the messages from our interviews with employers, all of whom encouraged selected employees to take appropriate, and more importantly relevant, postgraduate courses. Also, while the earlier interest in MBA graduates may have waned somewhat, there is a growing number of employers enthusiastic about some of the new style company-tailored MBA courses which integrate job experience with part-time study.

Related to this, is the apparent long term shift in the make up of the HE student population towards older students with employment experience. The extent to which this is a significant or even increasing trend among postgraduates requires further investigation.

Another issue is the position of women, both generally in the way they participate in postgraduate study and more specifically in relation to later entry and employee sponsorship. Currently, women represent just over one third of masters degree students and slightly less at PhD level. This is quite different from the situation at first degree level where female representation is approaching equality with men. While female numbers at postgraduate level are increasing, they are unlikely on current trends to equal those of men by the next decade. This contrasts with the situation in the US where female PhD graduates will outnumber men by 2,001. Some of the trends affecting the UK scene may work against increasing female participation, in particular the shift in the balance of funding from public to employer/self, and the growth in company sponsored CET. As regards the latter, it is likely to be scheduled at a time in career development when many women are taking time out of employment for family reasons.

8.4 Employment destinations

Information on first employment destinations for postgraduates is collated and published by the USR (the FDS data) although it cannot be regarded as providing a comprehensive or even reliable picture, for several reasons: (i) it shows information at the time of award, and therefore gives no indication of unemployment rates between finishing and graduating; (ii) it covers graduates only and therefore excludes drop-outs or those who fail to submit a final thesis; (iii) it is the university sector only, therefore excluding the 'old' college and polytechnic sector, where postgraduate Diplomates are particularly important; and (iv) it says nothing about mode of study, and therefore includes students who may be combining employment with part-time study.

The main feature to note from the FDS is that unemployment rates have always been relatively low for newly qualified postgraduates — even in 1991 it was only four per cent for masters and three per cent

for PhDs, compared to over ten per cent for first degree graduates. Unemployment rates of higher degree graduates in the population are only slightly higher than these new-entrant figures.

Another key feature is that postgraduates at different levels and from different disciplines supply quite different labour markets. Unemployment rates can vary considerably between disciplines, and within disciplines, between masters and PhD levels. Furthermore, there does not seem to be any link between unemployment rates and relative rates of growth in numbers graduating in the different disciplines. Postgraduate unemployment rates therefore provide insufficient evidence of demand trends or any skill shortage/surfeit existing in particular areas.

The highly vocational nature of many masters courses is reflected in the subject specificity of the first employment destinations; but at the same time there are also certain disciplines, such as IT, which have a very wide employment coverage. At PhD level, the academic sector remains the main destination. Here, however, an increasing proportion of PhD graduates are entering short-term contract research posts. It is increasingly unlikely that they will secure permanent teacher research positions at this stage. This is of some concern to the way academic careers are developing. A series of short term contract positions can lead to dissatisfaction in terms of security and motivation and have a potential damaging effect on longer term research projects.

8.5 Employer recruitment

Outside of the academic sector, there is very little evidence of a significant and separate demand for postgraduates, especially PhDs. While a job market for them certainly exists, the majority of postgraduates appear to be recruited as part of companies' mainstream graduate intakes, including competing directly with first degree graduates. The size and nature of the trends in demand are very difficult to determine because, once in the company, little recognition is often given to postgraduate qualifications. The exceptions are in some of the social science professions (*eg* town planning, social work) where a postgraduate qualification can be a significant part of professional training and of recognised standards of competence; and in the natural sciences where a PhD is a necessary step in pursuing an industrial R&D career. The latter, however, may be changing because of organisational restructuring, the development of dual careers (specialist and management streams) and the greater emphasis on personal skills in graduate entry.

The one recent source of general evidence of employer recruitment practice (PSI/IER) showed that in 1988, 40 per cent of employers had recruited a postgraduate (not necessarily direct from HE) and 16 per cent had specifically sought one. There are no other data available to substantiate this pattern, but from anecdotal evidence the latter figure would seem to be on the high side.

There is inconclusive evidence on the financial advantages to individuals of undertaking postgraduate study nor much on student motives in general. Not all employers of postgraduates pay a premium to them to reflect their higher qualification. In some disciplines, notably engineering and IT, PhDs have a lower perceived value from employers generally than others, say biochemistry. It is clear that the *relevance* of their studies is an increasingly important factor at all levels and disciplines as well as the 'people' skills of individuals. General assessments of the earnings of postgraduates qualifying between 1980 and 1986 show at best only slight financial advantage within the first few years, but surveys of professional groups do not provide consistent evidence either way. This range of evidence is hardly surprising, given the small, widely scattered and varied population that it covers, and the overlap in terms of jobs and careers of first and higher degree graduates. After all, the decision by an individual to pursue postgraduate study is often made because of intrinsic interest in the subject. In the last year or so, the alternative of immediate unemployment will have been a factor for those choosing to take a postgraduate course in order to delay their entry to the labour market in the hope that 'things are bound to improve in the future!'

8.6 Future demand

Future demand trends are undoubtedly linked to those of all graduates and in particular to the demand for highly qualified and professional manpower in the economy. Other key influences on future demand for postgraduates, especially the 'super-specialists', are likely to be the extent of European and international mobility and labour market trends and shortages in other countries, in particular the US in the case of scientists and technologists. The growth and development of HE as an employment sector, in particular changes to staff:student ratios, the scale and nature of future public funding, and its ability to attract and retain staff, will all affect future recruitment intakes.

Because of the level of future uncertainty that exists and the general paucity of data about current (and far less future) employer requirements, no reliable forecasts are available on likely future demand by discipline or level. The general picture is likely to be one of static or slightly expanding intakes, but there are too many interacting variables and too little analysis done on current demand to provide more than broad directions. A particularly important development is the expansion of the first degree market. It will start to resemble a mass market when a third of 21 year olds hold a first degree (a target for 2000). Postgraduates, though currently representing a much higher proportion of the graduate population than ten years ago, are still a small minority and will continue to be so. The future interaction between first and higher degree studies will be of interest.

8.7 Future research needs

We end this review by looking at further research needs. In the previous sections we have highlighted issues that are likely to be of importance to the postgraduate labour market in the future and could usefully be the subject of future research. These include:

- the changing employer requirements for postgraduates, by discipline and level
- the nature of jobs that postgraduates take up, their utilisation and extent of substitution for first degree graduates
- the implications for postgraduate study if we move towards a mass higher education system
- the extent and changing pattern of international recruitment
- the development of part-time study, and the nature of its associated labour market
- the future involvement of employers in supporting postgraduate education and the development of modular or credit based programmes for people in work
- the position of women, and barriers to improving their participation
- the early careers of PhD students, from the time their studies finish (thus including part-time students and those who fail to qualify)
- new funding options of HE and emerging employment patterns.

There are limitations on the current data sources on the employment of postgraduates, especially private sector employer demand. The following are a series of suggestions which we believe are important in understanding better the nature and workings of the postgraduate labour market generally, as well as undertaking future studies in specific areas as outlined above:

Disaggregation: There is a problem with most of the available data sources in that they simply distinguish higher from first degrees, rather than disaggregating the former into PhDs, masters and diplomas. This is in line with the ISCED international classification system. However, the relative growth and differentiation between these levels of postgraduate qualification means that these distinctions are more important than before. There may also be other useful distinctions, *eg* taught and research masters degrees.

Census data: There is an urgent need to obtain the Qualified Manpower Analysis from the 1991 Census. We understand that this will not be available until 1994, which was about the same length of waiting time as in the 1981 Census. The Census provides the only comprehensive data source of any reasonable size. Particular lines of enquiry could be to disaggregate the different types of postgraduate qualifications and subjects, women and men, and recent entrants to the labour market.

LFS: This is becoming an increasingly useful survey for research on graduates. However, numbers of postgraduates are still small. It would be useful to undertake some analysis on aggregated samples to obtain further breakdowns of employment data. This could not be done in the present review because of a lack of time. The LFS should also be looked at to see if additional questions could be asked about earnings, and also about subject.

FDS: The reliability of the process of data collection for postgraduate students is unclear. Certainly the anecdotal evidence suggests that there are a variety of practices within institutions and on the whole it is less satisfactory than for first degree graduates. Little or nothing is available on the former polytechnic and college sector, a gap that urgently needs to be filled. Also, it would be helpful if more USR data was published separately for the different types of degree and diploma study. It would also be helpful if a unitary source was established to cover all postgraduate output, and a question was added about 'time to complete'.

Existing data: There is scope for making more continuous use of existing statistical sources, *ad hoc* surveys and databases[1]. These would provide a sounder basis from which detailed analysis could be applied. The major drawback is their compatibility, in terms of terminology and of occupation and discipline classifications, some of which are too broad, for example when investigating skill shortage problems.

Projections: There needs to be greater emphasis in labour market analysis work on current employment and the short term future, rather than attempting to make accurate longer term projections.

Cohort/tracer studies: There are a few examples of these, mainly based on individual departments or disciplines. The main graduate follow-up study of 1980 provides only a very small amount of data on postgraduates. More surveys of this type would be useful, *eg* by making use of the growing alumni databases.

Employer-based studies: These are generally problematic in assessing future trends but are of most value in understanding current recruitment patterns, utilisation/substitution issues, and impact of shortages.It is recommended that more SMEs are included in samples in the future, as this is virtually an invisible area of employment in current graduate market analysis work.

International: In order to monitor trends in the international market, it is recommended that where possible distinctions are made between ISCED 7 upper and lower levels.

Finally, other ways of making current statistical sources more 'postgraduate friendly' in terms of analyses should be examined: for example reviewing the SOC codes for the R&D specialist category.

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[1] Improvements in the publication of data on supply and demand for scientists and technologists was highlighted as an area for future action in the recent science White Paper (HMSO, 1993).

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